JPRS-UEA-85-001

23 January 1985

USSR Report

ECONOMIC AFFAIRS

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

JPRS-UEA-85-001-L

23 January 1985

USSR REPORT

Economic Affairs

Contents

ECONOMIC POLICY, ORGANIZATION AND MANAGEMENT

GOSPLAN OFFICIAL EXAMINES INTENSIFICATION IMPACT

Moscow VOPROSY EKONOMIKI in Russian No 11, Nov 84 pp 3-12

[Article by Professor Vadim Nikitich Kirichenko, doctor of economic sciences and director of the Economics Scientific Research Institute under the USSR State Planning Committee: "The Current Stage of Intensification of National Production"]

[Text] The results of research conducted at the Economics Scientific Research Institute under Gosplan [USSR State Planning Committee] permit an in-depth examination of specific aspects of the current stage of the production intensification process, and of some of the most important economic and social conditions for expanding this process.

In working out a strategy for improving developed socialism in our country, the Communist Party of the Soviet Union has identified the transition to a primarily intensive type of reproduction as its basic policy for further economic progress; in terms of its economic significance this policy is comparable to radical transformations that have occurred during the period of the formation of socialism in our country, such as electrification and the industrialization of the national economy as a whole. Successful implementation of this course requires a comprehensive approach: a unified scientific and technical policy should be aimed at intensification , along with intersectorial and intrasectorial structural changes, foreign economic ties, improved economic management, economic incentives, personnel training and indoctrination, strengthened plan, technological, and labor discipline, and the development of socialist competition.

The transition to the intensive type of reproduction signifies qualitative changes, as a result of which growth in production (an increase in its final results) will exceed the increase in the total volume of resources consumed; there will be a rise in the proportion of the increase that is due to more efficient utilization of resources; and finally, this factor will become the predominant one in production growth. In other words, the process of intensification means that further economic growth will be provided more and more through improving quality and increasing the efficient utilization of resources, and not by increasing the volume of resources consumed.

It is important to stress here that intensification of production should lead to an increase in the over-all efficiency with which resources are utilized.

The process of intensification cannot be judged only by the utilization of one of the resources, for example, by the reduction in labor-intensiveness and by the proportion of the national income obtained by raising labor productivity. The fact is, more economical utilization of one type of resource often requires additional consumption of another type of resource. For example, an increase in labor productivity, and consequently, a decline in labor-intensiveness, are achieved by increasing the capital-labor ratio; and in periods of active replacement of living labor by embodied labor (embodied in means of labor), the decrease in labor-intensiveness is accompanied by a rise in the output-capital ratio. It is clear that in this case the level of intensification that has been achieved, considering the dynamics of all the resources taken together, is lower than the proportion of the increase in final results that is due to labor productivity alone. More complete utilization of raw materials, supplies, materials, and fuel, and more thorough processing at certain stages also require that additional means of labor be enlisted, as a result of which a reduction in the materials-intensiveness of an operation can be accompanied by an increase in the output-capital ratio. Only at a high level of technical and technological development in production, when a progressive sectorial and intersectorial structure has been achieved, is a reduction in the capital-output ratio accompanied by a reduction in labor- and materials-intensiveness.

Intensification involves various types of relations among the components of economic growth--the increase in the volume of resources and improvements in their utilization: the first type is an increase in production based on a simultaneous increase in resources and an increase in their effectiveness, while the latter factor starts to take on predominant importance in providing an increase in final national economic results; the second type is an increase in production with a constant volume of total resources consumed, achieved wholly through intensification; the third variant is reproduction under conditions of an absolute decrease in the volume of resources brought into economic circulation, with intensification providing the compensation for this reduction and all of the increase.

All these are various stages of intensification. Each of them has its own specific features with respect to investment, technical, structural, and social policy, improved planning, economic incentives, and the organization of socialist competition. What are the most important economic aspects of the current stage of intensification of national production which must be taken into account in the formation of current and long-range plans for the country's economic and social development?

The problem of intensification is a pressing one for all sectors and spheres of the national economy, and for practically all the country's major regions. However, an evaluation of the proportion of intensive factors at the beginning of the 1980s* shows that the major part of the increase in final national

*Calculations based on a production-function national economic model, in which the increase in national income due to the increase in total resource expenditures is interpreted as the result of extensive factors and the increase in the national income beyond this level is viewed as the result of intensification factors.

economic results (national income) was provided by an increase in the expenditure of production factors and only a small proportion of the increase was the result of more intensive utilization of these factors. On this basis, it can be said that the process of intensification was at the beginning stages. The transition to the intensive type of reproduction is a long-term task that forms the central link in the economic policy for the next few five-year plans for the economic and social development of the country's national economy.

Furthermore, before the 1980s, instead of periods in which there was an increase in the proportion of intensive factors in the rise in final national economic results there were periods in which this proportion declined. In the future it is necessary to create the scientific, technical, economic, and organizational prerequisites for continuous, steady increases in intensification.

The preceding years of the 11th Five-Year Plan offer evidence of an extremely important positive trend--the final results of production are growing at a faster pace than the total expenditures. The proportion of intensive factors contributing to the increase in national income started to rise, although not enough for the improvement in the utilization of resources to overcome the influence and consequences of slower increases in the number of people employed in production and slower increases in fixed production capital. The goal for the future is more complicated: intensification must not only compensate for the decline in the dynamics of fixed production factors, it must also become a means for accelerating economic growth as a whole.

The primary levers of intensification now and in the foreseeable future are relative reductions in the labor-, materials-, and energy-intensiveness of the final results of production. The capital-intensive type of technical progress is essentially what is being carried out at present. Between 1981 and 1983 the usable national income increased by 10.2 percent, and fixed production capital rose by almost 22 percent. The output-capital ratio rose. A reduction in this ratio will depend to a significant extent on improving the utilization of capacities that have been and are being created by balancing production factors (doing a better job of providing capacities with manpower with the appropriate skills, and with raw materials and supplies); on the conservation of materials, fuel, and power that is achieved; and on a reduction in the relative demand for these materials, since these resources are produced in the most capital-intensive sectors. This last factor requires broad incorporation of resource-saving technology. On the whole the goal for the future is to ensure first stabilization, and then a reduction in the capital-output ratio, along with an accelerated decrease in labor-intensiveness and materials-intensiveness.

In the near future the process of reproduction and increased intensification will be carried out by increasing the efficient utilization of resources and at the same time drawing additional resources into economic circulation (although at a slower pace than in the past). The demand for capital investments remains especially high. On the one hand, capital investments are needed to solve the problems of further accumulation of production potential in the most important sectors of the national economy--agriculture, the infrastructure, and several other sectors and types of industrial production that are lagging behind in

terms of the level of their technical equipment. On the other hand, considerable capital investments are needed to ensure further expansion of the process of intensification of production (raising the technical level of existing production by renewing means of labor, providing mechanization and automation, and improving working conditions). There is a growing demand for capital investments to maintain the level that has been achieved in obtaining raw materials and fuel by extracting minerals from a number of deposits that have been developed. In regions with a significant natural increase in the working-age population there is an urgent need to create new capacities and to increase the number of jobs.

Expanding the process of intensification requires planned development of a number of economic prerequisites and conditions. One of these is improving the structure of the distribution of national economic resources with the aim of meeting the public's demands, combined with the most efficient utilization of these resources. In this connection it should be pointed out that a structural policy for the distribution of resources (primarily in the area of capital investments), which is necessary for the given stage, is an important factor that maintains the rate of growth and production efficiency. For example, since the 7th Five-Year Plan there has been a considerable rise in the share of agriculture in the capital investments (from 20 to 27 percent), and since the 10th Five-Year Plan there has been a significant rise in the share of sectors in the fuel and power complex. The social and industrial need for this type of structural policy was determined by objective conditions: a high level of development in the country's agro-industrial and fuel and power complexes is an important prerequisite for intensification of all production. From a purely economic standpoint, however, the rapid and substantial rise in the share of these complexes in the distribution of reproduction resources (primarily capital investments) signified a shift in resources to spheres characterized by a relatively high and increasing capital-intensiveness. One of the consequences of this was an unfavorable effect on the dynamics of national economic results and effectiveness. Furthermore, a high concentration of reproductive resources in capital-intensive sectors of production limited the possibilities for their distribution among other sectors of the national economy, and specifically hindered rapid development of types of production that are less capital-intensive but that are of decisive importance in intensification. For example, with the substantial changes in the structure of the distribution of capital investments described earlier, the share of machine building changed very little. There was a rise in the unmet demand for capital investments needed for dynamic and proportional development of a number of other sectors and types of production.

Ensuring dynamic expanded reproduction and deepening the process of intensification require adjustments in the structural policy and manuevering of capital investments aimed at priority development of technically advanced and economical types of production, the introduction of resource-saving technologies, especially in production spheres and spheres that utilize fuel and power resources and basic building materials. Improving the structure of production is an important economic factor for mass, accelerated incorporation of achievements of scientific and technical progress.

Resolution of the given tasks depends on the development of machine building, which is the technical base of intensification of all of national production. This, like a number of other conditions (the need to increase productivity, improve working conditions, raise the proportion of complex cultural, personal, and household goods in the public's consumption pattern, and expand the country's export potential), identifies the development of machine building (primarily the production of industrial equipment) as a priority direction in the structural policy of redistribution of national economic resources. Only on this basis is successful technical re-equipment of the national economy possible, along with the introduction of materials- and labor-saving processes.

It is necessary to overcome the trend that has emerged during the current five-year plan toward a decline in the share of sectors of machine building in capital investments and increase this share in the coming five-year plans; machine building must be developed at an accelerated pace with the most substantial acceleration concentrated in instrument building, machine tool industry, electrical engineering industry, and chemical and power machine building.

Metallurgy enterprises must undergo in-depth technical reconstruction. The development of the production of polymer raw materials and polymer products is a priority direction in the chemical industry, especially accelerated production of building plastics to replace metals in machinery, components, and pipes, and metal and wood in building structures. Special attention must be focused on the development of capacities for producing packaging materials from synthetic materials, which is an effective means of conserving resources. Reducing losses of mineral fertilizers by improving the supply of packaging materials and plastic wrapping materials provides a savings that is 12 times greater than the capital investments required to do so. Replacing wooden packing material with packaging products made of synthetic resins and plastics provides an even greater savings than that obtained by replacing metal pipes with plastic pipes.

Substantial savings can be obtained by improving the structure of the fuel and power and agro-industrial complexes. For example, a search for more rational directions for capital investments in the agro-industrial complex should be useful. In the 1970s the following changes took place in the structure of the complex (in terms of fixed production capital): the share of the first sphere rose (the production of producer goods for agriculture and light and food industry); the share of the second sphere (agriculture itself) rose; and the share of the third sphere decreased (light and food industry). As a result, a little more than one-fourth of the fixed production capital in the agro-industrial complex is found in the first and third spheres. At the same time, it is common knowledge that when the agro-industrial sector of the economy is highly developed and efficient, the share of these spheres should be approximately two-fifths. An increase in the efficiency of the agro-industrial complex depends on an improvement in the distribution pattern of resources with a greater share going to the production of producer goods, and on an expansion of and increase in capacities for the storage and processing of agricultural products.

Important conditions for improving production efficiency and further development of intensification include greater proportionality in economic growth, overcoming manifestations of imbalance in the national economy, such as insufficient coordination among various elements of the production apparatus, poor coordination between the increase in production capacities and required expansion of the raw materials base, between the increase in production output and the development of capacities for storage, transport, and processing of the products, inadequate supply of material resources and inadequate capacities on the part of construction and installation organizations to meet the growing volume of construction needs, and so on. These aspects of imbalance at the contemporary stage are primarily responsible for the inefficient utilization of resources, which includes spheres in which large volumes of resources are used. Quantitative and qualitative discrepancies among production factors and various links of production and the infrastructure, and the existence of "bottlenecks" contribute to a situation in which there is a relative excess of individual production factors and therefore incomplete use is made of these factors. Ensuring a balance even when the qualitative status of these factors remains unchanged makes it possible to fully utilize the production potential and also helps improve production efficiency.

In the period being studied (especially after 1978), growth in the output of fuel and raw materials production declined, while there was a continued increase in the capacities of processing sectors, without adequate consideration for the slower growth in raw materials. For example, between 1961 and 1975 the coefficient by which the growth in fixed production capital in the processing industry and construction exceeded the growth in gross production in the extractive industry fluctuated between 1.8 and 1.9, while in the 10th Five-Year Plan it was 4.2.

On the basis of a survey of enterprises with production capacities put into operation after 1970, as of 1982 on the whole the efficiency of their utilization (based on commodity production) is less than planned, with substantial differences among sectors (in many extractive industries and ferrous metallurgy there is almost full utilization, while in the processing sectors the utilization is low). An analysis of the data confirms the conclusion that the primary reason for underutilization of planned capacities is inadequate supply of raw materials and other materials--the indicator of planned capacities put into operation is closely correlated to the indicator of the supply of material resources.

There is a similar situation in other sectors, including the chemical and petrochemical industries, machine building, and light and food industry. Here indicators for the supply of materials and the level of utilization of capacities that were made available through new construction are lower than those for capacities made available through expansion, reconstruction, and technical re-equipment of production.

Thus, there are considerable reserves available for improving the utilization of existing capacities and those being put into operation. The most important condition for realization of these opportunities is an increase in the supply of raw materials and other materials based on greater production in the extractive sectors, improving the qualitly of their products, and systematic

introduction of resource-saving technologies in the processing sectors. Mobilization of these reserves requires certain resources (especially capital investments) and a certain amount of time.

Plans for future capital investments must be worked out taking into account the availability of underutilized capacities in individual sectors; capital investments in these sectors, as a rule, should be aimed not at further increases in capacities, but at their technical re-equipment in order to reduce the materials-intensiveness of production. As already noted, fundamental resolution of the problems of providing industry with raw materials, supplies, and fuel and power resources is tied to an improvement in the sectorial structure.

A mandatory condition for efficient utilization of the production apparatus that has been created is a labor force with the required skills. By the beginning of the 1980s some substantial changes had taken place in the economic and demographic conditions involved in meeting the national economy's demand for manpower. This condition was not taken into account adequately as traditional forms were used to increase capacities (new construction, primarily). The dynamics of fixed capital were not tied sufficiently to the dynamics of growth in employment and there was no marked improvement in the utilization of manpower resources that were drawn into the national economy. In a number of cases this resulted in underutilization of the production capacities that were created.

The degree to which capacities are provided with manpower resources, however, differs greatly by region (which has been noted fairly often) and by sector and enterprise. Even with the general manpower shortage, individual industries and enterprises can experience manpower surpluses.

We can use data obtained in a 1982 survey of the group of enterprises mentioned earlier to illustrate this situation. On the whole the number of people employed exceeded the number of planned jobs by a small margin, and if one adjusts this indicator with respect to the utilization of capacities, it turns out that substantially more people are employed than required by plan. And at capacities introduced as a result of reconstruction and technical re-equipment, the surplus of employees compared to the planned number is greater than that for the entire group of enterprises surveyed. This indicates that as a result of reconstruction and re-equipment measures which are meant to reduce labor-intensiveness, the actual number of employees that are freed up is considerably less than planned.

On the other hand, practically one-half of the enterprises surveyed were not fully staffed. The sectors in which the manpower resources available were less than the average were identified. They included the chemical industry, electrical power engineering, a number of machine building sectors, and light and food industry. The main reason for difficulties in meeting the national economy's demand for manpower is not the so-called demographic situation, but inefficient utilization of the workers already in the work force and shortcomings in the organization of labor.

Major statewide measures carried out over the past 15-20 years have been aimed at further increases in the number of workers and at seeking out additional sources of manpower for this purpose. Meanwhile, the rate of mechanization of production and the reduction in manual labor has not corresponded to the country's economic, scientific, and technical potential. Therefore, saturating the country's economy with new contingents of workers has helped complicate the problem of meeting the demand for manpower. Manpower surpluses have developed in some sectors of production. This leads to a decline in intensiveness and to disruptions in the organization of labor. Surpluses of this nature are reserved to meet the labor demands that arise during "peak" periods that result from irregular operation of enterprises and to provide workers for agricultural operations, vegetable depots, and construction and harvest operations in urban areas.

The main condition for resolving the manpower problem is a substantial rise in the rate of growth in labor productivity through improved technical equipment and organization. To achieve this it is necessary to provide economic incentives for collectives and directors of enterprises, institutions, and organizations to get by with fewer employees while performing the same volume of work.

Reserves for improving the organization of labor must be utilized at every enterprise and in the national economy as a whole. In the final analysis this will mean an increase in the intensiveness of labor performed by the workers that will correspond to contemporary demands, as they make better use of work time and strengthen labor discipline. Evaluations based on data on manpower reserves and losses of work time show that better utilization of work time will make it possible to perform the current volume of work with considerably fewer employees in agriculture, industry, and construction.

A special economic and organizational mechanism should be created to ensure a planned release and redistribution of workers with the aim of meeting the national economy's demand for manpower under the current conditions of its development. The functions of directors of enterprises and organizations with regard to job placement for workers who are released should be transferred to local organs of power. A centralized system should be formed for retraining and improving workers' skills and a fund should be formed within the wage fund system to provide workers with financial assistance while they are looking for a new job.

Policies within the area of utilization of manpower resources should be developed taking into account substantial qualitative changes in the work force: the significant increase in the workers' educational level, improvements in their professional training, increased requirements for working conditions, and increases in the creative content of labor. There must be a substantial reduction in manual and heavy physical labor and unskilled and tedious labor. This is not just a purely social goal, it is also one of the most important prerequisites under contemporary conditions for meeting the demands of the national economy for manpower and for its development along the path of intensification.

Today there is a gap between the highly skilled, and especially the highly educated workers and the proportion of low-prestige jobs, unskilled labor, and zones with difficult and hazardous working conditions in the national economy. This means that the educational potential of the workers is underutilized and there are difficulties in providing manpower for manual, unmechanized jobs. Efforts to resolve this problem by increasing bonus payments and benefits have not provided satisfactory results. On the contrary, this has reduced the incentive function of wages in increasing labor productivity and it has become one of the factors contributing to a breakdown in the rational correlation between the rate of growth in labor productivity and wages. The fundamental path for resolving these problems is to change in working conditions through mechanization and automation.

Workers must be oriented toward intensification of production by improving the distribution of earnings so that they correspond more to the increase in the actual labor contribution of each worker and to the final labor results. For a long time the leading direction in wage increases was raising wages for workers in low-paying categories with a subsequent re-examination of wage scales for workers with higher incomes. The important social impact of this type of policy involved some negative consequences: the possibilities for providing economic incentives for highly-skilled workers were limited; levelling trends grew stronger, which in turn upsets the necessary correlation between labor input and quality and financial compensation, and leads to a relative underevaluation of skilled labor (for example, that performed by engineering and technical personnel). There should be greater differentiation in wages depending on labor results; disproportions should be eliminated in wages in various spheres of the national economy (i.e., the production and nonproduction spheres) and among various categories of employees (i.e., workers, brigade leaders, engineering and technical personnel).

Improving the organization of wages is one of the important conditions for achieving parity between the effective demand of the population and the supply of goods and services, which leads to an increase in the efficiency of national production. The existing lack of parity is due to a significant extent to the fact that the measure of wages exceeds the measure and results of labor. This phenomenon takes various forms and there are various reasons behind it. The reasons include an effort to resolve the problem of recruiting and keeping personnel by means of wages, as a result of which when a worker moves from one enterprise (or institution) to another he receives a wage increase, as a rule, although the nature of the work he performs may not change. An irregular flow of work leads to situations in which all employees must be working at one time and they need to work overtime, which means higher wage rates or other additional compensation. When workers are assigned the task of providing special "consulting" assistance, they retain their average monthly wages, which are paid regardless of the results achieved at the actual place of employment.

This phenomenon emerged as a result of downward adjustments made in plans for production output and efficiency indicators without changes in the planned wage fund. This violated the principle of financial responsibility for actual results of production activity. This phenomenon can be overcome primarily by means of stricter control (planning, banking, and administrative) over the formation and expenditure of the wage fund in the national economy.

In the area of construction, as a result of inadequate supply of capital investments and capacities for construction projects the time required to develop estimated values exceeds the norms. Planning and development of production capacities are also delayed. The long construction periods are accompanied by the risk of intrasectorial and intersectorial disparities in putting capacities into operation, because in the process of long-term development of production capacities their original balanced coordination is upset, which cannot be restored without additional capital investments. This can also contribute to delays in the incorporation of scientific and technical achievements in the means of labor that are being created, they can become obsolete even as they are being installed. A considerable amount of capital is taken out of national economic circulation in the form of unfinished construction.

These disparities also develop as a result of increases in the total cost of construction that is being carried out simultaneously (the construction front) that are more rapid than the rise in capital investments and the capacities of construction and installation organizations. Systematic expansion of the construction front, independent of the dynamics of capital investments, took place as a result of a significant increase in the absolute scale of new construction and its share in capital investments, and as a result of a re-examination of plans and estimates for construction projects already under way.

Both these processes are characterized by weak control, and their rational development is often hindered by bureaucratic and regional interests. Resolution of these problems requires stronger centralized control over the formation of the construction front and over the distribution of capital investments at the various stages of construction (construction starts, carry-over construction, and priority projects under way) and over the forms for the reproduction of capital (new construction and reconstruction), in addition to improved methods of analysis and planning.

On the other hand, the management mechanism in the sphere of contracting activity is in need of further improvement. It does not do an adequate job of directing construction collectives toward reducing the estimated cost of their work, and construction workers have practically no financial responsibility for the time required to erect various projects. On the contrary, construction organizations have an interest in achieving the highest "gross" cost indicators not by putting projects into operation quickly and within the planned time periods, but by increasing the estimated cost, and raising the materials-intensiveness of construction. An evaluation of the operations of construction organizations depends on direct estimated expenditures, with materials and structures accounting for the majority of these expenditures. Therefore, construction organizations prefer to perform the initial, and as a rule, materials-intensive operations in the construction cycle, giving less attention to finishing operations. There must be a change in the criteria used to evaluate the operations of construction organizations and the system used to form economic incentive funds.

Conditions for improving the effectiveness of capital investments and intensifying the investment process also include a change in the technical policies followed in construction and in the production of construction materials. A number of studies devoted to capital construction rightfully raise the issue of reorganization of the precast reinforced concrete industry and re-orienting it toward the production of lightweight structures. At the same time, the use of solid concrete should be expanded, along with the production of lightweight metal structures, glued wood structures, and materials and products from the chemical industry. This orientation in the production of construction materials will lead to a significant decline in the influence of the production base on the mobility of construction organizations.

The most important directions for improving the country's entire investment process were outlined in the decree issued recently by the CPSU Central Committee and the USSR Council of Ministers "On Improving the Planning, Organization, and Management of Capital Construction." Consistent implementation of this decree at all levels of planning and management should bring about fundamental changes in this basic sector of the national economy in the process of reproduction of fixed capital.

An important condition for strengthening the balance of national production is the inclusion of associations (and enterprises) in the development of state plans in order to ensure that their production programs correspond fully to the consumers' demands. To achieve this, the planning process should be based on a system of direct relations and economic agreements that reflect the consumers' specific demands for a detailed assortment of products. The economic agreement should be viewed as the basis for forming production programs. Organization of planning under these conditions will make it possible to achieve a limited combination of consolidated goals, economic norms and limits from the "center" and detailed five-year and annual plans based on the economic agreements.

Practical realization of this approach should entail the introduction of certain changes in the planning system which would make it possible for associations (and enterprises) to work out detailed economic agreements in a timely manner that would serve as a foundation for formulating production programs. This is possible when a model is used for working out agreements and plans that is based on the principle of a sliding two-year period: "pre-agreement-- agreement", "pre-plan--plan".

The conditions for the large-scale economic experiment state that the most important evaluative indicator of the formation of an enterprise's cost accounting funds is the fulfillment of the sales plan and agreements on the delivery of the required variety of goods within the established time periods. This is an important measure for increasing the responsibility of the primary link for ensuring coordinated development of production. In addition, it should be supplemented by the requirement that the suppliers must compensate the consumer for any losses suffered as a result of late deliveries and deviations from the agreed-upon products list. This will increase the economic influence on the balance of national production.

9967
CSO: 1820/51

INVESTMENT, PRICES, BUDGET AND FINANCE

CONFERENCE ON PRICES, ECONOMIC GROWTH HELD IN SUZDAL'

Moscow VOPROSY EKONOMIKI in Russian No 9, Sep 84 pp 156-157

/Report on conference by A. Kryukova: "Social and Economic Development and Price Movement"/

/Text/ A regular (fourth) expanded coordinating conference on the topic "Price and Economic Growth" organized by the Interdepartmental Scientific Council on Price Formation Problems of the USSR Academy of Sciences and the USSR State Committee on Prices, the Institute of Economics of the USSR Academy of Sciences and the Scientific Research Institute of Price Formation of the USSR State Committee on Prices was held in Suzdal' in May 1984.

The conference was devoted to the investigation of the interconnection of social and economic development and the dynamics of prices, which is an integral part of the development of theoretical principles of the planned management of social and economic processes.

Much attention was paid to a discussion of the sources of development of the tendencies toward a price movement. In particular, the causes forming the basis for the tendency toward a rise in wholesale prices of industrial products, which had arisen in the middle of the 1950's, were pointed out. The speech by Doctor of Economic Sciences V. Cheplanov, director of the Scientific Research Institute of Price Formation of the USSR State Committee on Prices, noted that the following were the causes of the definite rise in wholesale prices during the last decades: objective deterioration in the conditions of extraction of fuel-power and raw material resources; effect of mutual rises in the prices of products of various sectors on the price system; insufficient efficiency of utilization of new productive capital; growth of the material intensiveness of public production.

The significance of the degree of efficient utilization of fuel-power and raw material resources in the determination of the dynamics of expenditures and prices was stressed in speeches by Doctor of Economic Sciences V. Nemchinov, Candidate of Economic Sciences A. Gogoberidze (both from the Scientific Research Institute of Prices) and others.

The discussion aimed at solving the problem concerning the necessary direction of the price movement and at uncovering the nature of the dynamics of prices, in which the best conditions for the accomplishment of strategic

tasks of development were created. Most of the participants in the conference agreed that a systematic decline in the price level was most favorable for economic growth. A detailed argumentation of this position was set forth in the report by Doctor of Economic Sciences A. Deryabin (Institute of Economics of the USSR Academy of Sciences) and in speeches by A. Borzenko, chairman of the Tajik SSR State Committee on Prices, R. Svetlova, chairman of the Armenian SSR State Committee on Prices, and Doctor of Economic Sciences A. Salimzhanov (Administration of Affairs of the USSR Council of Ministers).

Candidate of Economic Sciences N. Chekhlov (USSR State Committee on Prices), Candidate of Economic Sciences S. Kirillov (Institute of Economics of the USSR Academy of Sciences) and E. Nazarov, chairman of the Turkmen SSR State Committee on Prices, pointed out the need for the stabilization of wholesale prices as the first step toward overcoming the tendency toward a rise in prices unfavorable for economic growth. Candidate of Economic Sciences Yu. Dmitriyev, deputy chairman of the Vladimir Oblast Executive Committee, chairman of the oblast planning commission, noted the decisive importance of the stabilization of prices of subjects of labor for a reduction in socially necessary labor expenditures on the output of machine building, which largely determine the dynamics of the entire price system.

An objective connection of the dynamics of prices and qualitative characteristics of economic growth was traced in a number of reports published in the materials of this conference. Doctor of Economic Sciences Yu. Borozdin (Central Economic and Mathematical Institute of the USSR Academy of Sciences) stressed that often economic growth was connected only with the effective side of production and considered an increase in production resources and in the scale of output. At the same time, an important problem--the degree of satisfaction of public needs--production and personal ones--remains in the background.

The report by Doctor of Economic Sciences O. Volkov (Moscow Order of the Red Banner of Labor Institute of the National Economy imeni G. V. Plekhanov) noted that economic growth requires the utilization of a price system that would lead not to the stabilization of the structure of socialist production, but would ensure its constant change. In the opinion of Doctor of Economic Sciences M. Kokorev (Institute of Economics of the USSR Academy of Sciences), the differentiation of prices and profitability norms stimulating intersectorial structural shifts in production was an essential condition for a stable economic growth.

The problem of specific measures to control the dynamics of prices evoked a lively debate. The participants in the discussion agreed on the following: The price is not the only tool of regulation of socially necessary labor expenditures, whose movement forms the basis for the dynamics of prices. Doctor of Economic Sciences V. Volkonskiy (Central Economic and Mathematical Institute of the USSR Academy of Sciences), Doctor of Economic Sciences O. Ozherel'yev (Leningrad State University) and D. Nikitin (RSFSR State Committee on Prices) believe that the effectiveness of the price is lowered by the fact that it performs superfluous functions, which often contradict each other. The speakers reached the conclusion that the function of accounting and measuring social expenditures was the most important function of the price. In

particular, M. Megrelishvili, chairman of the Georgian SSR State Committee on Prices, and T. Shushkov, chairman of the Vladimir Oblast Executive Committee, pointed out that the stimulation of improvement in the quality of consumer goods would be much more effective if it were carried out in accordance with the accounting function, not by means of price increments.

As shown in reports by Doctor of Economic Sciences V. Torbin (Scientific Research Institute of Prices) and Doctor of Economic Sciences N. Moiseyenko (Leningrad State University), to ensure the tendency of prices toward a reduction, their formation should be based not on the cost accounting principle of self-support, not on the utilization of the price as a tool of financing expanded reproduction, but rather on the demand for its active effect on the formation of planned and real labor expenditures on output.

Candidate of Economic Sciences M. Popov (Institute for Improvement of Skills under Leningrad State University), Candidate of Economic Sciences S. Rodin (Higher Economic Courses of the USSR State Planning Committee) and A. Chonoyev, chairman of the Kirghiz SSR State Committee on Prices, put forward a proposal on the formation of prices on the basis of the expenditures of the best enterprises in a sector. It was argued as follows: Such prices will force enterprises to lower production costs through the introduction of the experience of the most advanced enterprises in a sector. Such a principle of price formation met with objections. O. Ozherel'yev believes that the adoption of such a principle of price formation again puts the problem of unprofitable enterprises on the agenda. Meanwhile, there should be no such enterprises. Unprofitableness arises as the consequence of an incorrect evaluation of the activity of enterprises. If an enterprise creates output necessary for society, its expenditures cannot be lower than socially necessary expenditures.

In the course of the debate that unfolded V. Volkonskiy stressed that the establishment of prices at the level of average expenditures in a sector was unacceptable, because it did not properly stimulate economic growth, but only fixed the conditions presupposing the lack of production expansion. In his opinion, prices should be established on the basis of incremental expenditures, that is, expenditures that the increment in the production of a product cost. V. Volkonskiy's thesis evoked criticism on the part of many participants in the conference. Their main argument was that in their nature incremental expenditures were closing. Therefore, a changeover to prices based on closing expenditures would lead to their sharp rise.

S. Kirillov suggested that the expenditures regulating the price be determined as a boundary separating socially necessary and advisable production conditions from inadvisable ones. The establishment of this boundary appears as the result of the complex process of commensurating expenditures and results on the scale of society. When prices are established for the planning period, in themselves neither the expenditures of the best, nor the expenditures of the worst, nor the expenditures of incremental production facilities can be such expenditures, because their role is determined differently depending on the nature of the reproduction process and the correlation of production and consumption.

The rates and quality of economic growth depend on the scale of introduction of the achievements of scientific and technical progress. Doctor of Economic Sciences N. Shekhet (Moscow State University) and Candidate of Economic Sciences V. Gerasimovich (All-Union Scientific Research Institute of Systems Research of the State Committee for Science and Technology and the USSR Academy of Sciences; reports are presented in the materials of this conference) reached the conclusion that prices of new equipment should be built so that its purchase is advantageous only for the enterprises or associations that were able to utilize these means of production in the most efficient way. The marginal price in the closing sphere of application of new means of production can serve as the model of these prices.

However, in A. Deryabin's opinion, an enterprise should not only be provided with incentives for the introduction of new equipment and technology, but also be subjected to sanctions if it does not do this. Therefore, it is necessary to establish prices of new types of products at the level of the amount of production costs of the second (third) year of series production and the normative profit. Simultaneously with the establishment of the price of new output it is necessary to lower prices to the level of planned production costs not only for the replaced output, but also for the entire output, in which the new design or technological solution inherent in new output can be utilized. When the prices of the produced products are lowered, financial plans are drawn up without changes. The norm of deductions from the profit into the budget should be lowered for the enterprises that were the first to master new output.

The introduction in unprofitable sectors of accounting prices for the formation of economic incentive funds and the capital use charge as one of the ways of lowering wholesale prices was discussed in the report by Candidate of Economic Sciences M. Gvelesiani (Institute of Economics and Law of the Georgian SSR Academy of Sciences).

Other urgent price formation problems were also touched upon in speeches by the participants in the conference. For example, Doctor of Economic Sciences A. Malafeyev (Leningrad Institute of Economic Research), M. Megrelishvili and D. Nikitin came out in favor of a discussion of the problem of retail prices. Doctor of Economic Sciences V. Yesipov (Leningrad Institute of Finance and Economics) drew attention to the need to generalize the results of introduction of new purchase prices and, especially, purchase price increments. The urgency of solution of the problem of long-term prices and development of the price model was substantiated in speeches by Doctor of Economic Sciences G. Kovalevskiy (Institute of Economics of the Belorussian SSR Academy of Sciences) and N. Chekhlov.

Particular problems of the methodology, methods and organization of the process of planned price formation were touched upon in speeches by Doctor of Economic Sciences A. Zav'yalkov (Belorussian Institute of the National Economy), Candidate of Economic Sciences A. Kryukova (Institute of Economics of the USSR Academy of Sciences), D. Shekoyanets (Armenian SSR Council of Ministers), Candidate of Economic Sciences V. Yefremov (Scientific Research Economic Institute under the USSR State Planning Committee), Candidate of Economic Sciences V. Lipsits (Scientific Research Institute of Prices) and so forth.

The series of overall price reduction measures undertaken by price formation bodies was unanimously approved at the conference. The final document noted that a prompt change in prices in accordance with the changing conditions of production and consumption was one of the main prerequisites for an acceleration of the rates of economic development. The expanded coordinating conference recommended that economists working in the field of the theory of planned price formation pay special attention to problems of price regulation of economic growth.

The course of the discussion showed that the transformations in the price system did not exhaust all the possibilities of price regulation of social and economic processes. The solution of a number of urgent price formation problems is directly connected with the financial and credit mechanism. The participants in the conference recommended that the next coordinating conference be held on the topic "Interconnection of Price Formation and the Financial and Credit System."

11,439
CSO: 1820/45

ECONOMIC MODELING AND COMPUTER TECHNOLOGY APPLICATION

TEXTBOOK ON ECONOMIC CYBERNETICS REVIEWED

Moscow VOPROSY EKONOMIKI in Russian No 7, Jul 84 pp 131-133

[Review by A. Modin of book "Ekonomicheskaya kibernetika" [Economic Cybernetics] by N. Ye. Kobrinskiy, Ye. Z. Mayminas and A.D. Smirnov, Moscow, "Ekonomika", 1982, 408 pages]

[Text] The publication of VUZ college textbook on economic cybernetics is important because, firstly, it makes it possible to present a profile of this specialty, in which economist-mathematicians have been trained for more than two decades already; secondly, it lays the methodological foundation for this specialty and links previously uncoordinated courses in the economic-mathematical disciplines, bringing them into a definite system; thirdly, the textbook is also useful for a broad circle of economists who wish to understand how economic-mathematical models and cybernetic approaches are correlated with fundamental economic categories.

On the whole, the authors, who previously prepared educational materials for a course in economic cybernetics, have summarized many years of experience in teaching the subject; they have coped well with the task of writing a textbook. It is characterized by a high scientific-methodological level of exposition for extremely difficult material; it collects and systematizes the achievements of science not only in economic cybernetics, but also in related areas, especially in the theory and practice of utilizing economic-mathematical models and computers in the management of public production.

The textbook opens with a section devoted to the subject and methods of economic cybernetics and its basic concepts. The authors share the opinion of Academician V. Nemchinov when they write: "The subject of research in economic cybernetics is the functioning and development of the economy as a managed system and above all the mechanisms--which are informational in content--for the management of economic production" (p 16). Accordingly, economic cybernetics has also been seen as the connecting link among the general theory of cybernetics, the economic-

mathematical methods and the complex of economic sciences of which it is a part (p 20). This understanding of the subject of this science makes it possible to clarify as well the profile of the corresponding VUZ specialty today, when the actual application of economic-mathematical methods and computers is becoming universal. It is under precisely these conditions that specialists in economic cybernetics must provide for the systems formulation of economic tasks, which are resolved by means of the latest scientific and technical equipment and which are related to increases in production effectiveness and to the comprehensive improvement of production management. The experience of creating and utilizing ASU (automated control systems), as well as many economic experiments, show how acute the need for these specialists is. After all, economic cybernetics, in the opinion of the textbook's authors, concentrates attention on the informational representation and adjustment within a system for managing processes directed at transforming resources into the goods and services necessary to our society (p 17).

However, this leading line of the economic-cybernetic approach is not maintained with sufficient consistency throughout the textbook. For example, in the key third chapter, which is devoted to the characteristics of the economic system and of production as the transformer of resources and as a social subsystem, primary attention is devoted to material processes. Of course, this material, which summarizes the corresponding tenets of other academic disciplines, is important as a kind of "introduction" to the object of economic cybernetics, but it would be better to present here the informational aspect specific to economic cybernetics.

An analysis and synthesis of the economic system constitute the central methodological idea of the textbook. The analysis makes it possible to study the components of the system, their place and relationships, as well as to reveal the structure of the system. The synthesis consists in the recombination of these elements into a single whole, into a functioning system.

The second section of the textbook is devoted to an analysis of the economy. It opens with a discussion of methdological questions, a discussion which acquaints students with the bases of mathematical modeling of the economy and with how to devise models to take account of concrete features of economic processes, especially the reciprocal relations among these processes. Good mathematical training is required here, and, it is important for it to be provided by the curricula in the mathematical disciplines (it is no wonder that the corresponding chapter is suggested for optional study).

The last chapters of the section study social consumption, production-technological structures, as well as the economic dy-

namics and methods of economic prognostication. In their presentation of these complex aspects of an analysis of the economy and its functional blocks, the authors have succeeded in ensuring the organic unity of their substantial and formalized examination using models. The starting point is a content-rich, qualitative analysis, while economic-mathematical models are utilized not as a target in themselves but as a means for a clearer representation of the problems posed by the analysis. This kind of approach is fundamentally important for training specialists, who must make comprehensive use of economic-mathematical methods and models in the practice of planning and managing the economy.

For the most part the authors analyse the functional blocks of production and consumption, and not the organizational-structural units of the economy (enterprises and associations of the territorial production complexes, sectors and inter-sector complexes), although they do refer to them. This probably results from the role of economic cybernetics in the framework of the academic disciplines, as well as the so-called sector economies. However, a closer relationship with them would require finding within the framework of a course on economic cybernetics adequate forms for presenting an organizational-structural analysis of the economy with a generalized description of the models for the respective units of the economy (and especially because the last section contains optimatization models for some of them). It would also be necessary to think about the definite variability of the textbook's material, and the possibility of adapting it to the curricula of specific VUZ's and their economic profile.

The textbook's third section contains an examination of a broad range of methodological problems of synthesis--proportionality, development according to plan, management principles and planning, formalized models of plan calculations, consideration for the limits of planning and its cycles and manageable factors. The problems of optimizing the functioning of a socialist economy are singled out for particular emphasis. Unfortunately, however, the examination of these problems is limited largely to the tasks of forming an optimal plan for the development of the economy with the use of various modeling instruments. This is hardly sufficient for resolving the key task of economic cybernetics--the synthesis of the economic system as a single functioning organism.

Questions of effectiveness and economic evaluations occupy an important place in this section. Here the authors describe in a comprehensive manner the problems of comparing the costs and results of production and the methods of determining the effectiveness of capital investment; they provide a critical analysis of the various concepts and models of plan price-formation.

A great deal of attention is devoted to multi-level synthesis and realization of the plan. The treatment of this problem required the isolation of other elements in the economic system in comparison with that set of elements which was described in the second section. The authors have succeeded in providing in a generalized form a description of various approaches to the construction of models for multi-level synthesis and to present models for current and future sector planning. They have also considered questions related to the material provision of production, the formation of reserves and the management of stocks. The last chapter of the third section is devoted to a critical analysis of models for regulating a capitalist economy. In this regard, it is shown clearly that under capitalism, the synthesis of the economic system which is realizable by national economic planning is impossible.

The fourth section of the textbook provides an economic-cybernetic description of management processes. Here the authors present first of all the general stages of management and their implementation in the operation of various planning-economic organs. Proceeding from the goals and functions of management, they deal with construction features and types of organizational structures. A great deal of attention is devoted to the problems of meta-management as the bases for improving the economic mechanism in general and for bringing it into line with the level of development of production forces and with the requirements of scientific-technical progress.

In this section a great deal of space is given to the information problems of management. To start with, a description is provided of the basic tenets of information theory as applied to the features of economic systems management and of the entire process of transforming information and making decisions. The above-described tenets are taken into account in the consideration of the theoretical and applied questions of constructing data processing systems in management. This section concludes with a chapter entitled "Economic Cybernetics and the Improvement of Management," which contains a treatment of the important tasks of managing the economy in the light of the decisions of the 26th party congress and the subsequent CPSU Central Committee plenums; it also contains a description of the basic directions of this process and of the ways to realize the decisions of the CPSU Central Committee and the USSR Council of Ministers on how to improve the planning and management of the economy and how to increase the influence of the economic mechanism on the work of increasing production effectiveness. Proceeding from the requirements which they have examined, the authors analyze the problems of developing the scientific-technical base of management, linking it above all with the development of ASU. Accordingly, a description is provided of the structure of automated control systems and of its various subsystems. The features of specific

automated control systems and of an automated system for plan calculations, etc. is provided.

The authors treat briefly but with sufficient clarity the prospects for the development of economic cybernetics, while isolating theoretical, methodological and applied problems. In this regard emphasis is put on the need to resolve problems related to the comprehensive analysis and synthesis of socio-economic, production-technical and organizational-economic structures in the processes of the functioning and development of an economic system. Unless it is resolved many local methods of economic cybernetics will not give the necessary practical output. The determination of future directions of research in the area of economic cybernetics is extremely useful inasmuch as it may contribute to the development of scientific work at the respective faculties of higher educational institutions, as well as to the formation of subjects for term papers and diploma projects for students.

This standard textbook, which corresponds to the current level of science, will help to improve the study of economic cybernetics at various universities and institutes. It will help not only to raise the quality of instruction provided for students, but it will also be useful for the self-education of those specialists already working in the national economy, and above all of those employed in creating and using automated control systems and in using economic-mathematical methods and models in planning and managing the economy. It is clear that the textbook will find application in the teaching of certain groups of students in other economic and engineering specialties.

At present it is correct to consider introducing an economic cybernetics course into the curricula of all the economic specialties in order to give them a comprehensive idea of the tasks of analysis, synthesis and management which can be solved by means of economic-mathematical methods in various units of the economy. A large part of the material in this textbook can serve as the basis for such a course.

Of course, the experience gained in using this book in the actual teaching of economic cybernetics (aside from the above-mentioned inadequacies) will suggest other ways to further improve the curriculum and the subsequent editions of this textbook. It is important for this work to be carried out promptly because the first edition was issued in limited numbers (20,000 copies).

8543
CSO: 1820/38

REGIONAL DEVELOPMENT

NEW DEVELOPMENT TRENDS IN NORTHWEST REGION EXAMINED

Leningrad IZVESTIYA VSESOYUZNOGO GEOGRAFICHESKOGO OBSHCHESTVA in Russian No 4, Jul-Aug 84 pp 297-304

[Article by B. V. Moskvin and A. I. Chistobayev: "The New Economic Region Formation in the Northwestern Part of the USSR"]

[Text] Economic region formation is very closely connected with planning. As N. N. Baranskiy has emphasized, it "not only depends on planning, but is also one of the most important conditions of its existence" ([1], p 4). Economic region formation is the method and form, as well as the essence of planning. For this reason, it has always been given a great deal of attention both on the part of scientists, as well as on the part of specialists of the planning organs.

The most important distinguishing feature of socialist region formation are its perspective trend and problem character. The development of every region takes place under the influence of distinctive combinations of historical, natural and socio-economic conditions. These conditions create the unique features of every region: They influence the structure of the economy, the character of the distribution of projects, and the scales and growth rates of production; they also determine the level of the participation of the regions in the solution of large national economic problems of all-union significance. Under the influence of the special features of the indicated conditions, concrete region-complex problems arise in the process of the development of the productive forces. The solution of these problems conditions the specificity of the specialization and comprehensiveness of the development of economic regions.

During the contemporary state of the development of socialist society, as a result of the steady intensification of the territorial division of labor, the development of the material-technical base and the technical equipment of labor, as well as the accelerating scientific-technical progress in all spheres of the national economy, there has been a sharp increase in the scale of economic activity and the territorial economic structures have become more complicated. The growth of production volumes is accompanied by a deficit of natural resources and the complication of the demographic situation. This necessitates the exploitation of poorer and difficult-to-extract, and consequently more expensive natural resources, the pursuit of a labor-saving policy,

and the strengthening of measures to increase the birth-rate. Consequently, it is necessary to constantly specify the conceptions and basic directions of the development of the productive forces of the country, the union republics, and the economic regions. An important basis of such work is economic region formation.

For contemporary processes of region formation [rayonoobrazovaniye], the increase of the number, complexity and scale of economic problems being solved in the economic regions is characteristic. Some of them do not enter into the framework of regions (for example, the problem of the transformation of the non-chernozem area, the development of the BAM [Baykal-Amur Trunkline] zone and others), others are decided within the confines of individual parts of economi regions (for example, the formation of the Yuzhno-Yakutskkoye, Timano-Pechorskoye and other territorial production complexes). The growth of the "problematic nature" is an objective reflection of the progressive development of our society and the deepening of the national division of labor and, as its form, the territorial division of labor.

The perspective trend and problem character of the formation of regions reflect the objectivity of the boundaries of economic regions for the determination of the visible (in practical respect) time segment. This signifies that it is necessary to revise the network of economic regions periodically and to define it more precisely. Obviously, the length of such a period must coincide with the period of long-term planning, i. e., encompass a period of up to 20 years. In this case, the significance of the formation of regions increases for the optimization of the combination of industrial and territorial planning. In addition, the complication and growth in the scale of tasks of the development of socialist society required, in economic region formation, the calculation not only of purely productive factors, as was previously the case, but also social factors. From year to year the significance of the ecological factor increases, as well as the factor of the administration of territorial development.

A radical revision of the network of economic regions was last undertaken in 1963. Naturally, during the period that has passed there have been enormous quantitative and qualitative changes in territorial development. The practice of national economic planning urgently requires the further improvement of the network of economic regions. The urgency of this task grows especially under conditions of the new system of perspective planning, viz: The development of regional programs of scientific-technical progress for the period to 2005, plans for the development and location of productive forces by economic regions for the period to 2000, and plans for the basic directions of economic and social development of the projects of territorial planning for the period to 1995. These documents now have not only recommendatory, but directive character. Of no smaller significance for region formation are also the development of plans for comprehensive economic and social development for a number of economic regions for an average-term (5-year) period, the creation of the institution of USSR Gosplan representatives for the economic regions, and the improvement of the forms of territorial planning and administration.

In the scientific literature, the necessity has frequently been noted to define more precisely the network of economic regions, in particular in the

north-west part of the country [2-6]. It cannot be said that the viewpoints of the investigators of the question of the composition and boundaries of the economic regions of this part of the country have been identical. Some authors have substantiated the division of the "Great Northwest" into two regions, so to speak, "along the vertical", i. e., they have proposed in essence to return to the old regional division that existed prior to 1963. Other investigators have fought for the separation into an independent region of the European North consisting of two oblasts--Arkhangelsk and Murmansk oblasts--and two autonomous republics--the Karelian ASSR and the Komi ASSR. In our view, the divergence in opinion is explained by a single, but very important reason. As is well known, the basis of the formation of every region is its territorial production complex, i. e., its nucleus. Within the limits of the "Great Northwest", three such complexes are being formed: The Karelo-Murmanskiy, Dvino-Pechorskiy, and Leningradskiy complexes [6]. According to N. N. Kolosovskiy, the first two complexes are typical complexes of northern industry, the third is a complex of manufacturing industry.[4]

The program-oriented direction of socialist planning, which has gained strength during the past few years, has increased the significance of the problem approach to planning. Such an approach makes it possible, on the one hand, to concretize, rank and determine the temporary stages of the solution of the problems of economic and social development of every economic region, proceeding from general state interests, and, on the other hand, it reinforces the requirement of a problematic nature with respect to a network of economic regions. Every one of the economic regions is distinguished by a strictly individual group of regional-complex problems, emanating from the peculiarities of its development, as well as from the requirements of the modern and perspective all-union territorial division of labor. V. M. Chetyrkin [6] repeatedly wrote about such a problematic nature in economic region division.

The consideration of the peculiarities of the economic and social development of the northwest part of the USSR and the oblasts and autonomous republics located here supports the conclusion, drawn by N. N. Kolosovskiy, concerning the formation of the three above-mentioned complexes of regional scale in this territory.

In order to improve the division of economic regions and bring it closer to planning practice, the USSR Council of Ministers, in November 1982, by special decree, approved the proposal of the USSR Gosplan concerning the separation of a Northern Region, consisting of Arkhangelsk, Vologda and Murmansk oblasts and the Karelian ASSR and Komi ASSR, from the Northwest Region.* The following thus remained in the composition of the Northwest Region: Leningrad, Leningrad Oblast, Novgorod Oblast and Pskov Oblast. Thus, if previously three regional production complexes were united in the Northwest Region, now it is one--the most developed one.

*) The decree of the USSR Council of Ministers in November 1982 simultaneously provided a more precise definition of the boundaries of the Volga and Urals economic regions of the USSR. This definition concerned essentially the Bashkir ASSR, which was taken out of the Volga economic region and included in the Urals economic region.

Such a complex represents an independent economic region (the Northwest Region), and two others, which are only now being formed, are united in the Northern Economic Region of the USSR.

The Northwest Economic Region plays a specific role in the all-union division of labor because of its peculiar economic-geographic situation, the historically highly-developed economic potential, the presence of skilled workers, the economic unity of the territory, the unified transportation system that has developed, and the powerful socio-economic nucleus--Leningrad. Branches of Leningrad scientific-production associations and enterprises are located in Leningrad, Novgorod and Pskov oblasts. Not only industry, but also other sectors--agriculture, transportation, construction, as well as science, material-technical supply, trade and the nonproductive sphere--are very closely linked with Leningrad. All of this increases the demands made on territorial planning and makes for the necessity of developing a plan for the comprehensive economic and social development of Leningrad and Leningrad Oblast, taking into account the plans for Novgorod and Pskov oblasts. The solution of this task required thorough research of the prospects of the development of the productive forces of this territory as a united economic complex. As the results of the research show, there exist here the community of the conditions and special features of the improvement of the regional and oblast economic complexes and the unity of goals for long-term development.

The Northwest economic region occupies a small territory (194,500 square kilometers), which is distinguished by high economic development. Useful minerals --oil shales, peat, phosphorites, bauxites, and building materials--are virtually fully involved in exploitation. Broad use is being made of timber, water and land resources. The peculiar geographic situation creates the preconditions for the development of inter-regional and inter-state relations, the growth of transit and export-import functions of state-wide significance.

The basic sectors of union specialization are highly specialized and precision machine building and the light and chemical sectors of industry. In addition, the oil-processing, the wood pulp and paper, and the confectionery industries, and the building materials industry have specialization significance. One of the leading economic spheres--is science and scientific services; resting on it, the Northwest became one of the most important scientific-production bases of union significance, a conduit of scientific-technical progress, and a center of training of skilled personnel.

The level of development of auxiliary and service sectors of industry--electric power, food and other sectors of the economy, construction, agriculture, and transportation--is high. Thus, regardless of the scantiness of agricultural land and, above all, sowing areas, which constitute 1.9 million hectares or $\frac{1}{4}$ hectare per inhabitant, the region fully supplies its needs with respect to potatoes, poultry meat, eggs, and some types of vegetables. A significant part of the required meat, milk and other agricultural produce, with the exception of grain, is also locally produced. Especially high is the level of the development of agriculture in Leningrad Oblast. It indicates significant reserves for the development of agriculture for the region as a whole.

During the past three five-year-plans (from 1966), the population has grown by 15.4 percent. The growth of the population is occurring basically through its mechanical influx into Leningrad, which accounts for almost 90 percent the entire population growth. The share of the urban population as a whole for the region increased from 77.5 to 85.2 percent during 1966-1980. The rural population is constantly declining.

The basic part of the economic potential--of industrial and agricultural production, the production and social infrastructure--is accounted for by Leningrad and Leningrad Oblast. This is also where the greater part of the population lives. The level of socio-economic development is also correspondingly higher in this part of the region.

The most important tasks of the improvement of the economic complex of the region are related to every conceivable intensification of labor, the improvement of the utilization of the economic potential that has been created, the broad reconstruction of enterprises, the renewal of obsolete equipment, and the maximum use of all reserves of labor productivity growth. It has been decided to limit new construction in the region to the utmost degree, and to bring it to a complete stop in Leningrad, with the exception of projects related to the development of municipal services and the improvement of the satisfaction of the daily needs of the population. The economic potential of Pskov and Novgorod oblasts will be built up at accelerated rates in the region. Industrial development will proceed along the line of the mechanization and automation of production without an increase in the number of employed. The development of machine building is connected with the reconstruction and expansion of the Chudovo Power Machine Building Plant, the plant for accessories in Novgorod, the Kirovskiy Zavod, tne Nevskiy Zavod, and the Izhorskiy Zavod Associations;of the chemical industry--with the building up of the capacities of the Novgorod Azot Production Association, and the Fosforit Production Association in Leningrad Oblast. The opening of new production is connected with the modernization of models already being produced and the mastery of unique new models. Thus, the powerful nuclear-powered vessel "Rossiya" [Russia] is being created, in the construction of which the latest technical achievements are being utilized, the output of ships with horizontal loading method is getting underway. The workers in the tractor industry are building a new, still more powerful and reliable K-710 tractor. The diesel building industry is securing the output of powerful ship diesel engines with increased service life. The power engineering industry is continuing the output of unique power-generating units for the Ekibastuzskiy, Kansko-Achinskiy and other electric power plants, reactors for nuclear power stations with a capacity of 1 million kilowatts. Already underway is the serial production of gas pumping equipment for the gas trunk pipelines and highly-productive machine-tools with numerical program control "the processing center". The production of floating installations for the extraction of oil from the shelf of the sea is beginning, as well as of rock excavating machines for the mining industry.

The broad construction of combined feed plants, dairy and livestock fattening complexes, and poultry farms in all oblasts of the region, the increase of the capacities of the cheese plant in Staraya Russa, and the con-

struction of a plant for dry skimmed milk in Pskov Oblast contribute to the solution of the food problem.

The development of flax cultivation is being realized as part and parcel of the improvement of flax processing. The construction of several new flax plants in Novgorod and Pskov oblasts has been planned.

The basic directions of the improvement of the economic complex of the region, which emanate from the general tasks of the economic and social development of the country and the special features of the natural and socio-economic conditions of the region, are linked to the achievement of the following regional goals:

--The increase of the role of the region in the development of production which secures scientific-technical progress in the national economy, meeting the requirements of uniqueness, non-material-, energy-, and resource-intensiveness;

--the development of sectors and individual production units with an export orientation--instrument-making, machine-tool industry, power machine building, the production of means of automation, etc;

--the strengthening of the significance of the region as a historical, scientific, cultural and socio-recreational center;

--the improvement of the intra-regional economic proportions, the acceleration of the development of the sectors of the agro-industrial complex and the non-production sphere;

--the equalization of the levels of economic and social development of the oblasts of the region.

The further development of the economic complex of the Northwest economic region will raise its contribution to the improvement of the territorial-sectoral structure of the economic complex of the country.

The Northern Economic Region is unique in terms of the scales and diversity of natural resources. It is the largest fuel and energy base (oil, natural gas, gas condensate, coal, peat, and oil shale) in the European part of the USSR. The supplies of timber and water resources are significant. Of great industrial significance are the supplies of ores for ferrous and non-ferrous metals, chemical raw material, and construction materials. Not all types of natural resources are being exploited at the present time. The economic complex of the region is still only in the process of formation.

Apart from the natural resource potential, prerequisites of the development of productive forces are the advantages of geographic location in relation to the central regions of the country--the basic consumers of natural resources, closeness to foreign trade partners, the presence of ice-free sea ports and a trunk-line transportation network, industrial junctions and centers that have developed, and a historically-formed constant population with traditions and habits specific for the economy and culture of the region.

The totality of natural and socio-economic prerequisites makes it possible to form several regional multi-industry economic complexes. Under the influence of the transportation factor and the consistency of the solution of the production tasks in the course of many decades, the consolidation of a number of such complexes into territorial socio-economic systems has taken place. However, at the present time this process is not yet complete. Intra-regional economic relations are distinguished by a low level of development. The most important of them are relations with respect to raw materials (timber, ferrous and nonferrous metal ores, fuel), as well as relations with respect to the infrastructure (power transmission lines, freight and passenger transportation, etc.). There is no single economic-cultural center, in which the socio-economic relations of the region would be "tied together". These functions are fulfilled by the capitals of the autonomous republics--Petrozavodsk, Syktyvkar, and the centers of the oblasts (Arkhangelsk, Vologda, and Murmansk), but in part also in part by other cities (Apatity, Vorkuta, Kotlas, Ukhta, and Cherepovets). The home [ochagovyy] character of the economic development and settlement of a significant part of the territory has caused the undeveloped state of the system of isolated settlement (dispersal), which has a disrupted geographic range, but also the beginning stages of formations (groups of territorially adjacent communities). Inter-oblast relations were established within the boundaries of the Karelo-Murmanskiy and Dvino-Pechorskiy (Arkhangelsk, Vologda oblasts and the Komi ASSR) production complexes, relations among the latter exist only with respect to iron ore (supplies from Karelia and Murmansk Oblast to the city of Cherepovets of Vologda Oblast). The community of socio-economic problems and the unity of the directions of the solution of basic economic tasks confronting them served as a reason for the unification of the complexes within the limits of one economic region.

The sectors of production specialization developed on the basis of the exploitation of natural resources and their processing. These are the sectors of the timber industry complex, ferrous and nonferrous metallurgy, chemical, fuel and fish industry. During the past few years, machine building--ship building and ship repair, the production of equipment and specialized technology for the timber industry complex, and road equipment have been in the process of being transformed into a sector of union specialization. Some service sectors of industry--the power industry, the construction materials industry, light and food industry--have undergone significant development.

Agriculture is specializing in dairy and meat animal husbandry, flax cultivation and industrial poultry breeding. Plant growing is distinguished by a low level of development. Besides flax, which is prevalent only in Vologda Oblast, potatoes, vegetables, and feed grain are grown in the region, coarse and succulent feed are being procured. The natural conditions do not allow securing the requirements in regard to agricultural production, for this reason a significant part of it is being supplied from other regions of the country.

The basic directions of the development of the productive forces of the Northern Economic Region flow from the necessity of solving the most important regional problems--the fuel and energy problem, the mineral and raw material problem, and the food problem--and they are linked to the achievement of the following goals:

--The strengthening of the fuel-energy, metallurgical and timber industry bases of union significance;

--the expansion of geological survey work and the more comprehensive study and utilization of natural resources;

--the intensification of the established specialization of the region through the broad introduction of scientific-technical progress in the development of natural resource exploiting sectors, taking into account the requirements of the "truncation" of the economic complex for the purpose of every conceivable economy of labor, which is especially costly here;

--the continuation of the formation of the Timano-Pechorskiy and other territorial production complexes and the development and implementation of a system of measures for the levelling of the negative influence of the growing anthropogenic burdens on the environment for the purpose of the maintenance of the extremely unstable ecological balance here;

--the securing of conditions of the vital activity of the population of the region that alleviate to the utmost the negative influence of the natural conditions of the North and the character of work on the organism of man.

The indicated basic directions of the development of productive forces are already being realized in the 11th Five-Year-Plan. The capacities of existing electric power stations (the Kol'skaya Nuclear Power Station, the Petrozavodskaya Thermal Electric Power Plant, and others) are being increased and new electric power stations are being built (the Pechorskaya State Regional Electric Power Station, the Krivoporozhskaya Hydroelectric Power Station on the Kem' River, and others). The Zapadno-Soplyasnoe gas condensate deposit in the Komi ASSR is being put into operation, the exploitation of oil and natural gas in previously developed fields is being intensified, and the capacities of the Olenegorsk and Kovdor iron ore concentrating plants are being expanded and the Kostonuksha Iron Ore Concentrating Plant in Karelia with a capacity of 5.8 million tons of iron ore pellets a year is being put into operation. The capacities of the Apatit Production Association for the extraction of Kola Peninsula apatites are being expanded. A number of new integrated logging-lumbering enterprises are being built in the Arkhangelsk Oblast and the Komi ASSR. The capacities of ferrous metallurgy are growing: Plans call for the introduction of a fifth blast furnace with a volume of 5,580 cubic meters and a productivity of 4.5 million tons of pig iron a year, and a new rolling mill 2000 is being introduced at the Cherepovets Metallurgical Plant. The timber raw material base allows the development of wood-working and pulp and paper industry: The Kondopoga and Segezha pulp and paper combines, the Syktyvkar Timber Industry Complex, and the ski factory in the city of Sortavala are being expanded, and a new pulp and paper plant is being built in the city of Sokol.

The construction of new capacities for the production of fertilizers for agriculture in the Ammofos Production Association in Cherepovets is subordinated to the solution of the food problem. The network of animal fattening complexes, dairy farms, and combined feed plants is being expanded. Dairy

plants, poultry factories, hothouse combines and combines for cereal products are being built. The intensification of agriculture is taking place through the growth of its technical equipment, the expansion of land improvement work, and the increase of the standards of agriculture.

The development of the leading industries is being encouraged by the growth of production and the technical equipment of the service and auxiliary industries and the production infrastructure. The Onezhskiy Tractor, Machine-Tool Building and Ship Construction and Repair plants in Petrozavodsk, Bearing Plant No 23 in Vologda and many other projects are being reconstructed and expanded. The production of new types of vessels, timber procuring technology, wood-processing and ore extraction equipment is being introduced. The transportation development of the territory is being increased: The highway network is being expanded and there is an increase in the carrying capacity of the railways; the construction of gas trunk pipelines is being accelerated and centralized power supply, river and sea navigation are being developed. The most important projects of transportation construction are the highways between Vologda and Arkhangelsk and Leningrad and Murmansk.

Large measures are being implemented in the sphere of the protection of the environment and the renewal of natural resources. In industrial enterprises purification equipment is being introduced, which secures the purification of sewage water and emissions into the atmosphere, the sanitary fleet is growing, which secures the collection of debris and other types of surface pollution of the water area of sea and river ports. There is a sharp increase in the work with respect to timber renewal, including the planting of forests and assistance of its natural renewal.

The economic development of the region is closely combined with its social development and the steady growth in the standard of living of the population. Not only the increase in the wages of workers and employees, but also the continuing extensive housing construction, the increase in the network of trade enterprises, as well as the medical and the cultural and personal services of the population are a reflection of this process.

Among the intra-regional territorial tasks of the development of the economy of all-union significance which are actively being solved in the 11th Five-Year-Plan, the leading role belongs to the formation of the Timano-Pechorskiy Territorial Production Complex in the north of the Komi ASSR and in the Nenetsk Autonomous Okrug. The creation of this complex is linked with the development of its fuel-energy, timber and water resources, as well as with diverse mineral raw material. At the present time, extensive development of fuel-energy and timber resources is taking place here. Next is the development of nonferrous metals, building materials, and water resources.

The contrast of the peculiarities and basic directions of the economic and social development of the Northwest and the Northern economic regions of the USSR dictates an originality of methods and means of improving the regional economic complexes and increasing the standard of living of the population. This specific character is already being taken into account in the long-term

planning, in particular in the development of regional integrated programs of scientific-technical progress and plans for the development and distribution of productive forces.

Literature

[1] Baranskiy, N. N., "Kratkiy kurs ekonomicheskoy geografic. Vyp. 3. Obzov SSSR po ekonomicheskim oblastyam" [A Short Course on Economic Geography. Issues 3. Survey of the USSR by Economic Regions], 5th ed., Moscow, Moskovskii rabochii, 1931, p 4. [2] Granik, G. I., "Ekonomicheskiye problemy razvitiya i razmeshcheniya proizvoditel'nykh sil Yevropeyskogo Severa SSSR" [Economic Problems of the Development and Distribution of Productive Forces of the European North of the USSR], Moscow, Nauka, 1971. [3] Kazanskiy, N. N., Moskvin, B. V., Chistobayev, A. I., "The Dvino-Pechorskiy Regional Production Complex," PLANOVOYE KHOZYAYSTVO, No 7, 1975, pp 63-78.[4] Kolosovskiy, N. N., "The Production-Territorial Combination (Complex) in Soviet Economic Geography," VOPROSY GEOGRAFII, sbornik 6, Moscow, Geografgiz, 1947, pp 133-168. [5] Pavlenko, V. F., "Territorial'noye planirovaniye v SSSR" [Territorial Planning in the USSR], Moscow, Ekonomika, 1975, 226 pp. [6] "Problemy rasvitiya i razmeshcheniya proizvoditel'nykh sil Severo-Zapadnogo rayona" [Problems of the Development and Distribution of the Productive Forces of the Northwest Region], Moscow, Mysl', 1978, pp 231-288. [7] Chetyrkin, V. M. "Regional Complex Problems and Economic Region Formation," VESTNIK LGU [Leningradskogo Gosudarstvennogo Universiteta], SER[IYA] GEOL[OGII] I GEOGR[AFII], No 12, 1960, pp 90-99.

8970
CSO: 1820/16

INTRODUCTION OF NEW TECHNOLOGY

METHODOLOGY FOR DETERMINING EFFECTIVENESS OF NEW TECHNOLOGY

Moscow VOPROSY EKONOMIKI in Russian No 9, Sep 84 pp 141-152

/Article: "Methodology for Determining the Economic Effectiveness of Application of New Technology in the National Economy"/

/Text/ This methodology was worked out in accordance with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures To Accelerate Scientific and Technical Progress in the National Economy" (No 814 of 18 August 1983) and is published for a discussion.

The draft of the methodology was prepared by the working group of the Scientific Council on the Problem "Economic Effectiveness of Fixed Capital, Capital Investments and New Technology" of the USSR Academy of Sciences consisting of academician T. Khachaturov, Doctor of Economic Sciences V. Krasovskiy and Candidate of Technical Sciences M. Loyter under the general scientific guidance of academician T. Khachaturov on the basis of the regulation No 14000-698 dated 16 May 1984 of the Presidium of the USSR Academy of Sciences. The draft of the methodology was approved mainly at the joint meeting of the Scientific Council of the Institute of Economics of the USSR Academy of Sciences and the indicated scientific council.

This methodology is designed to replace the Methodology (Basic Provisions) for Determining the Economic Effectiveness of Utilization of New Technology, Inventions and Efficiency Proposals in the National Economy (1977).

On the basis of this methodology sectorial instructions are subject to drafting by ministries and departments in coordination with the USSR State Planning Committee and the USSR State Committee for Science and Technology. The instruction on material incentives based on the data on the effectiveness of new technology for the participants in its development, production, introduction and mastering is subject to drafting by the State Committee for Inventions and Discoveries and the All-Union Society of Inventors and Efficiency Experts.

I. General Provisions

1. This methodology aims at the establishment of a single approach and methods of calculations in the economic substantiation of the development and application of new technology in the national economy for the purpose of accelerating scientific and technical progress in accordance with the decisions of the 26th CPSU Congress and subsequent plenums of the CPSU Central Committee,

as well as with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures To Accelerate Scientific and Technical Progress in the National Economy" (No 814 of 18 August 1983).

2. The concept of "new technology" means technology increasing the effectiveness of production and labor productivity, which in its technical and economic indicators corresponds to the highest world level, as well as advanced techniques and methods of production organization ensuring an increase in the effectiveness of production. At the same time, new technology improved on the basis of principles already in use and latest technology based on recent achievements of science and fundamentally new techniques are differentiated.

3. New technology includes the following groups of measures:

a) development of new types and improvement in the designs of produced machines, mechanisms and devices, as well as their introduction and application;

b) overall replacement of equipment with improved one in the entire technological chain with a full or partial reconstruction of the technological process;

c) modernization of the equipment used and its replacement with improved one and of a bigger unit capacity;

d) development of new types of materials, fuel and energy and their introduction and application;

e) improvement in the physical and chemical properties, parameters and assortment of output;

f) standardization of types, units and parts of products in accordance with standards;

g) development of new and improvement of existing technological processes;

h) mechanization and automation of work and production processes;

i) development of new and improvement of existing methods of labor and production organization and of production specialization and cooperation.

New technology also includes measures to eliminate occupational hazards for workers' and employees' health and to improve labor safety techniques and environmental protection. When overall scientific and technical programs and other measures for the introduction of new technology are implemented, indicators of the rise in workers' standard of living and well-being should be determined in connection with them.

4. Calculations of the economic effectiveness of measures for the introduction of new technology are performed for:

a) determination of the most effective directions and establishment of the order of measures for the development of technology;

b) determination of the economic and social effect from the introduction of new technology;

c) selection of the most effective variants of implementation of measures for the development of technology, that is, those that most fully meet economic and social demands;

d) determination of the effect of introduction of new technology on plans for economic and social development.

5. As a rule, the development and application of new technology require capital investments and calculations for the determination of their effectiveness represent calculations for the determination of the effectiveness of capital investments. In accordance with this the present methodology utilizes the basic provisions and formulas of the Standard Methodology for Determining the Economic Effectiveness of Capital Investments (1980), as well as the standards of general and comparative effectiveness and consideration of the time factor. The effectiveness of measures not requiring capital investments is determined on the basis of the reduction in production costs provided by them.

6. In the calculations of the effectiveness of new technology and substantiation of the advisability for its development, production, introduction and utilization the national economic approach is mandatory. A new technology measure can be included in the state plan if it is demonstrated that it is effective within a given sector and subsector and contributes to an increase in the effectiveness of the entire national economy. In connection with this the effectiveness of a new technology measure should be determined both in the national economic link, within the limits of which its implementation is envisaged, and in allied (associated) production sectors, as well as among consumers.

7. The effectiveness of new technology measures is determined by comparing the effect from their implementation with the expenditures necessary for this. The increase in the national income due to new technology is its general national economic effect. The increase in net output in comparable prices is the effect in national economic sectors and subsectors, ministries, departments, associations and enterprises respectively.[1]

The ratio of the increase in national income (in comparable prices) produced by new technology to the expenditures on the new technology producing this increase (in the same comparable prices) is the criterion of its national economic effectiveness throughout the country and, of the increase in net output produced by it, at other levels of management.

At the cost accounting level of management and, in particular, when enterprise funds and bank credits are used for the production or introduction of new technology, the increase in profit or reduction in production cost in the total

1. Since part of the effect can be due to measures not connected with new technology (for example, organizational), or to a change in prices, if possible, this should be taken into consideration in calculations.

volume of output resulting from new technology is taken as the effect. Accordingly, cost accounting effectiveness is evaluated by the ratio of the effect to the amount of expenditures connected with new technology.

8. When analyzing the effectiveness of new technology measures, it is necessary to take into consideration the average time gap (lag) between the implementation of every measure or a combination of measures and the derivation of the effect if it is over 1 year.

The procedure for determining the lag and its utilization in calculations is established in sectorial instructions with due regard for the data on the length of development, introduction and utilization of new technolgy until the full mastering of planned capacities and other technical and economic indicators.

9. As a result of the development of any given type of new technology an economic potential is formed, being realized as this technology is introduced and mastered in production. The economic effectiveness of new technology directly depends on whether it is introduced fully, or only partially. The degree of utilization of the economic potential should be taken into consideration both during the determination of this very potential for a specific year of introduction of new technology and during the evaluation of its economic effectiveness.

At the national economic level of management the economic potential of a specific type of new technology is calculated in the following manner:[1]

$$\begin{aligned} Э_t = &[(C_{ст} - C_{нт}) + E_н K_д] A_t + \\ &+ [(C'_{ст} - C'_{нт}) + E_н K'_д] A'_t \end{aligned} \qquad (1)$$

where:

$Э_t$ is the economic potential of the production and application of this type of new technology in t year;

$C_{ст}$ and $C_{нт}$ is the unit production cost of old (replaced) and new technology respectively;

$K_д = K_{ст} - K_{нт}$ are additional specific capital investments, that is, their difference in the production of old (replaced) and new technology:

A_t is the annual volume of output of new technology in t year;

$C'_{ст}$ and $C'_{нт}$ is the unit production cost of products in t year produced by means of old (replaced) and new technology respectively;

$K'_д = K'_{ст} - K'_{нт}$ are additional specific capital expenditures (apart from expenditures on new technology) in sectors using it instead of obsolete technology;

1. At the cost accounting level of management the calculation of effects for the producer and consumer of new technology, see paragraph 40.

A'_t is the maximum calculated annual volume of output in sectors applying new technology in t year;

$E_н$ is the standard coefficient of comparative effectiveness (see paragraphs 27-29).

In formula (1) the first term reflects the change in expenditures during the development and production of new technology (that is, in the producing sector) and the second, during its application (that is, in the consuming sector) with a full utilization of the economic potential of new technology in each of these sectors.

10. If the actual volumes of the production and application of a given type of new technology differ from the maximally possibles ones, its effectiveness is determined depending on the degree of utilization of the economic potential in a given year. If the economic potential is not calculated, the effectiveness of new technology is determined in the 3rd year of its introduction and the effectiveness of new technological processes or new production organization is taken in the 2nd year of their introduction. On the basis of these data the amount of material incentives for the creators and organizers of the introduction of new technology is determined.

The determination of the share of incentives subject to payment should be established in the sectorial instructions on the effectiveness of new technology and in a special instruction on the calculations of material incentives for its development and introduction.

11. During the determination of the economic effectiveness of new technology measures connected with the accomplishment of long-term tasks the evaluation and substantiation of the economic effectiveness of new technology should be made through the determination of the integral effect with due regard for the possible changes in prices and standards of effectiveness.

Integral economic effectiveness is determined by summing up all the possible effects from the application of new technology throughout years and 5-year periods during the entire service of new technology and correlating the obtained sum of effects to the amount of expenditures during the same years. At the same time, the effects and expenditures for long-term periods are taken with due regard for the time factor.

$$Э_{инт} = \frac{\sum_1^t Э_t (1 + E_{нп})^t}{\sum_1^t З_t (1 + E_{нп})^t}, \qquad (2)$$

where $Э_{инт}$ is integral effectiveness;

$Э_t$ is the effect in t year (increase in net output or the national income);

$З_t$ are expenditures in t year;

$E_{нп}$ is the standard of effectiveness for reducing expenditures incurred at different times (see paragraph 32).

12. The effectiveness of expenditures on long-term programs for the introduction of new technology is determined on the basis of the calculation of the integral effect during the period of the program's implementation and the subsequent effective utilization of the introduction of new technology (see paragraph 23, f).

In the calculations of the effectiveness of new technology measures for a long-term period it is necessary to take into consideration the probability nature of the process of development and application of new technology (see paragraph 53).

13. In planning and drafting total (absolute) economic effectiveness is determined as the ratio of the effect to expenditures on a given new technology measure and comparative economic effectiveness, as the ratio of production cost savings to the difference in capital investments in variants. Calculations of the total (absolute) and comparative effectiveness of new technology measures are performed at different stages of realization of the economic potential in accordance with paragraph 10.

14. Expenditures from all sources of financing, including expenditures on construction and installation work, the purchase of equipment, means of transportation and implements, scientific research, planning and surveying work and other types of preparatory operations connected with new technology (for example, expenditures on special purposeful training of cadres of operators for the developed technology and so forth) are taken into consideration in the volumes of expenditures adopted for the calculation of the effectiveness of new technology measures. Expenditures on the formation (replenishment) of circulating capital or a reduction in its size in connection with the production, introduction and application of new technology should also be taken into consideration.

15. When the effectiveness of new technology is determined, associated expenditures on the elements in which their increase occurs in allied sectors (in the absence of reserves of capacities in them) are taken into consideration, including:

a) in the development of capacities of the local construction base;

b) in the development of the power and raw material base and in water supply;

c) on the compensation for losses caused by the introduction of new technology;

d) in environmental protection.

If in connection with the implementation of new technology measures there is a need for new construction or an expansion of existing production, in addition to direct and associated productive capital investments, when both total and comparative effectiveness is determined, the following should be taken into consideration:

e) capital investments in the construction of residential, municipal, cultural-domestic and other projects necessary for securing and retaining the enlisted manpower;

f) expenditures on the relocation of workers and their families;

g) expenditures on personnel training;

h) capital investments in transport construction, as well as current expenditures necessary for the delivery of raw materials and transportation of finished products and for ensuring passenger communication.

The calculation of all these expenditures is performed on the basis of existing standards of specific capital investments and circulating capital adopted in appropriate sectors and, in the absence of standards, according to other consolidated indicators.

16. When major overall technical measures are implemented, calculations of direct and indirect effects and expenditures should be performed for individual measures forming part of the complex and for the entire complex throughout the years and 5-year periods of implementation of these measures.

17. In the calculations of indicators of the effectiveness of new technology the fullest possible comparability of the effect of new technology and expenditures should be ensured. When capital investments, production costs, operating expenditures, net output and additional indicators are calculated, prices, rates, wage scales and other price forming standards in effect at the moment of performance of calculations are applied.

For a changeover from constant estimated to current prices the application of coefficients according to the elements of expenditures or indices of the estimated cost of construction and installation work and the cost of equipment as a whole is allowed.

18. For the purpose of an all-around substantiation and analysis of the economic effectiveness of new technology and the detection of specific potentials for increasing its effectiveness, when decisions are made, indicators characterizing various aspects of the obtained effect are also utilized: labor productivity, output-capital, specific capital investments, saving of material expenditures (with the singling out of the saving of metal, fuel and power) and production cost. The possibility of increasing the effectiveness of new technology at individual stages of its introduction--from relatively low effectiveness at initial stages to higher effectiveness at subsequent stages--is also taken into consideration. Furthermore, the improvement in the structure and organization of production in connection with the introduction of the achievements of scientific and technical progress, acceleration of the periods of mastering of planned indicators introduced at new, reconstructed and retooled enterprises and other aspects of the effect of new technology on the economic and social development of sectors, regions and the country as a whole are taken into consideration.

19. When the effectiveness of new technology is evaluated, it is necessary to uncover and take into consideration social, along with economic, results not fully reflected in the cost evaluation:

liquidation of heavy physical or monotonous labor and improvement and facilitation of working conditions;

rise in the level of labor safety techniques;

improvement in the population's living and domestic conditions;

elimination of occupational injuries and diseases;

improvement in the condition of the environment and saving of natural resources.

For these calculations it is necessary to utilize the Provisional Standard Methodology for Determining the Effectiveness of Expenditures in the Nonproductive Sphere and the Provisional Standard Methodology for Determining the Economic Effectiveness of Nature Protection Measures.

II. Total (Absolute) Economic Effectiveness of New Technology

20. The total (absolute) economic effectiveness of new technology is determined at all the stages of the planning of its development, production, introduction and application, as well as during the evaluation of the results of fulfillment of the plans for new technology and other measures.

Calculations of the absolute effectiveness of new technology are utilized in order to obtain the value of the economic effect that given new technology measures can bring. At the national economic level absolute effectiveness is needed when the increases in the national income derived from the introduction of new technology are made more precise. The data on the absolute effectiveness of new technology are also utilized in the planning of the volumes of net output in sectors, subsectors, associations and enterprises and in the determination of the results of cost accounting activity of enterprises, associations and individual ministries.

21. The indicators of the absolute economic effectiveness of new technology resulting from calculations are compared with the standards and with similar indicators during the preceding period, as well as with the indicators of its effectiveness at the advanced associations and enterprises of corresponding sectors. New technology measures are considered economically effective if the indicators of total effectiveness obtained for them, in any case, are not lower than the standards and report indicators during the preceding period. At the same time, the economic effectiveness of new technology at existing associations and enterprises should be not below the level ensuring the payment of the capital use charge, and of the interest on bank credit, as well as rent and other fixed payments, the formation of funds for the development and stimulation of associations and enterprises and the payment of the disposable balance of profit into the budget.

The following are the standards of the total (absolute) effectiveness of new technology:

a) for the national economy and its sectors and subsectors, as well as for the Union republics and the country's regions, the ratio of the effect in the form of an increase in the national income or an increase in net output connected with the introduction of new technology to the expenditures on it, which should be attained during the planned period;

b) for cost accounting associations, enterprises, their units and individual measures, if net output is not calculated, the ratio of profit or production cost savings to the expenditures on new technology.

Standards of the total (absolute) effectiveness of capital investments are established by the USSR State Planning Committee in accordance with the existing system of planning for 5 years, as well as for long-term planning documents for 10 to 20 years: a) for the national economy as a whole and b) differentiated for individual sectors (subsectors), as well as for the allocations of capital investments (new technology, nature protection and so forth), in sectorial and specialized instructions.

Standards of total (absolute) effectiveness in sectors, subsectors, associations and enterprises should be determined with due regard for the indicators of effectiveness of advanced enterprises and the prospects for the introduction of the achievements of scientific and technical progress into production, but, as a rule, at a level not below the one actually attained during the preceding period under review. The standard of the total (absolute) effectiveness of expenditures in new technology, as well as of capital investments in the national economy as a whole, is established (as the ratio of an increase in the national income to net capital investments) at the level E_a=0.16. In national economic sectors the standards of total (absolute) effectiveness are established in sectorial instructions in coordination with the USSR State Planning Committee and the USSR State Committee for Science and Technology.

Keeping in mind that standards of the effectiveness of new technology for the planned period are determined with due regard for the attained levels of total (absolute) effectiveness, the values of these standards in sectors and subsectors of industry, agriculture, transport, communication, construction, trade, procurement and material and technical supply are established at a level not below the values actually attained during the preceding 5-year period with due regard for the potentials for increasing them during the planned 5-year period. These standards are established in sectorial instructions in coordination with the USSR State Planning Committee and the State Committee for Science and Technology.

Standards of total (absolute) effectiveness are subject to a revision by the USSR State Planning Committee and the State Committee for Science and Technology, which it is advisable to time to coincide with the periods of preparation of five-year plans. In the future their value should increase as labor productivity and technical progress grow and as the material and capital intensiveness of output decreases.

22. Standards of effectiveness for application during the examination and substantiation of the effectiveness of capital investments in overall scientific and technical programs and individual technical and economic problems of development of new technology should be calculated as weighted mean values in accordance with the sectorial composition of these programs and technical and economic problems on the basis of corresponding sectorial standards. A change in sectorial standards for application in the calculations of the effectiveness of new technology in programs with long periods of implementation is made with due regard for the forecast of prices of products, for the production of which the implementation of these programs is envisaged in coordination with the USSR State Planning Committee.

23. The following indicators obtained according to planning, drafting and report data are applied in the calculations of the total (absolute) economic effectiveness of new technology measures:

a) For the national economy as a whole, its sectors and the national economy of the Union republics $Э_{НХ}$, that is, the ratio of the annual increase in the national income (net output) produced as a result of the application of new technology in comparable prices (Д) to the expenditures (capital) $К_{НТ}$ on new technology producing this increase:

$$Э_{нх} = \frac{Д}{К_{нт}}. \qquad (3)$$

The value $Э_{НХ}$ should be compared with the standard of total (absolute) effectiveness E_a and, if $Э_{НХ} \geq E_a$, the considered capital investments are regarded as effective.

b) For industrial sectors, agriculture, transport, communication, construction, trade, overall scientific and technical programs and individual technical and economic problems $Э_{ЧП}$, that is, the ratio of the increase in the annual volume of net output attributed to new technology to the expenditures (capital) on new technology producing this increase.

$$Э_{чп} = \frac{ЧП}{К_{нт}}, \qquad (4)$$

where ЧП is the increase in net output.

The value $Э_{ЧП}$ should be compared with the sectorial standard of total (absolute) effectiveness for new technology $E_{ЧП}$ and, if $Э_{ЧП} \geq E_{ЧП}$, the considered capital investments are regarded as effective.

c) For cost accounting subsectors, associations and enterprises, in particular, when their own funds and bank credits are utilized, the profitability of expenditures on new technology determined as the ratio of the increase in the annual profit or of the decrease in production costs to the expenditures (capital) on new technology producing this increase is used as the indicator of its effectiveness.

$$Э_{п} = \frac{П}{K_{нт}}, \quad (5)$$

where П is the increase in profit produced by new technology.

The value $Э_{П}$ should be compared with the corresponding standard of the total (absolute) effectiveness (profitability) of new technology $E_{П}$ and, if $Э_{П} \geq E_{П}$, the considered new technology measures are regarded as effective.

d) For individual items, including newly developed new technology and individual measures, the profitability indicator is also determined as the ratio of profit (or decrease in production costs) to the necessary capital investments, which is calculated according to the following expression:

$$Э_{пп} = \frac{Ц - С}{K_{нт}}, \quad (6)$$

where: $K_{НТ}$ is the estimated cost of the developed new technology or the expenditures on the implementation of a measure;
Ц is the annual output (according to the plan) in wholesale prices of the enterprise (without the turnover tax);
С is the production cost of annual output after a full mastering of new technology.

The obtained value $Э_{ПП}$ is compared with the profitability standard $E_{ПП}$ and, if $Э_{ПП} \geq E_{ПП}$, the considered new technology measures are effective.

e) For sectors and enterprises, where the indicator of decrease in production costs is applied, as well as for enterprises planned to operate at a loss, the indicator of total (absolute) economic effectiveness for new technology is measured by the ratio of the saving resulting from the decrease in production costs to the expenditures on new technology producing this saving.

$$Э_{с} = \frac{C_1 - C_2}{K_{нт}}, \quad (7)$$

where C_1 and C_2 is the production cost before and after the introduction of new technology respectively.

The value $Э_{С}$ is compared with the corresponding sectorial standard $E_{С}$ and, if $Э_{С} \geq E_{С}$, the considered capital investments are regarded as effective.

f) For long-term overall scientific and technical programs it is recommended that the integral effect obtained as a result of the implementation of these programs be determined in a running total with the determination of the period during which the amount of the effect will be equal to or exceed the amount of capital investments. For programs implemented with the utilization of bank credits or with the funds of an enterprise, association or sector the volume of profit obtained during a similar period is also evaluated in a running total.

The period determined in such a way is considered the standard period of reimbursement of expenditures (capital) on new technology.

$$\sum_{i}^{T} П = K_{нт}, \tag{8}$$

where: T is the period of reimbursement;
П is the volume of profit obtained in t year as a result of the application of new technology;
$K_{НТ}$ are expenditures (capital) on new technology.

24. When the total (absolute) effectiveness of new technology is determined, the time factor is taken into account both in the form of the lag between the effect and expenditures and in the form of calculation of losses resulting from the freezing of nonfunctioning expenditures during the (entire) period of development, introduction and mastering of new technology and with the utilization of the standard of total effectiveness.

The calculation of losses resulting from freezing is utilized only in the determination of the total (absolute) economic effectiveness of capital investments and cannot serve as the basis for a change in the estimated cost of new technology or output produced by means of it.

25. When the total (absolute) effectiveness of new technology is determined, an analysis of factors affecting its increase or decrease is made.

These factors include the following:

a) Change in the labor intensiveness of output making it possible to free manpower as a result of the application of new technology or requiring the enlistment of manpower with due regard for the expenditures on the establishment of the entire necessary social infrastructure--housing, cultural and domestic institutions and so forth--and the expenditures on personnel training, as well as with due regard for changes in working conditions.

Saving of live labor:

$$Э_ч = Ч_{ст}P - Ч_{нт}, \tag{9}$$

where: $Э_Ч$ is the relative saving of annual workers;
$Ч_{СТ}$ and $Ч_{НТ}$ is the industrial and production personnel with old and new technology;
P is the growth of annual net output after the introduction of new technology.

b) Change in the material intensiveness of output freeing additional resources of means of production in the national economy or increasing the expenditures of these resources.

Saving of material expenditures:

$$Э_м = M_{ст}K - M_{нт}. \tag{10}$$

where: $Э_м$ is the relative saving of material expenditures;
$M_{ст}$ and $M_{нт}$ is the material intensiveness of output with the utilization of old and new technology;
K is the growth of output after the introduction of new technology.

c) change in the capital intensiveness of output ensuring the saving of capital investments or producing their overexpenditure:

$$\frac{\Delta\Phi}{\Delta П} = K, \tag{11}$$

where: ΔΦ is the increase in capital;
ΔП is the increase in output;
K are the required capital investments for an increase in output.

d) change in the quality (durability and reliability) of output leading to a change in capital and current expenditures on the satisfaction of the need for this output.

$$\Delta Д \to \Delta(C + E_н K) \text{ и } \Delta Н \to \Delta(C + E_н K), \tag{12}$$

where: ΔД and ΔН are changes in the durability and reliability of output
$\Delta(C+E_нK)$ is the change in the reduced expenditures on these purposes.

e) degree of utilization of the economic potential of new technology during the year of performance of calculations (see paragraphs 9 and 10).

III. Comparative Economic Effectiveness of New Technology

26. Methods of comparative effectiveness are applied for the economic substantiation of the best variants of the development, production, introduction and utilization of new technology. At the same time, observance of the rules of identity of compared variants (before and after introduction) in terms of the volume, quality and periods of production of products is mandatory.

27. The minimum of reduced expenditures is the indicator of the best variant determined on the basis of comparative economic effectiveness.

The reduced expenditures on each variant represent the amount of current expenditures (production cost) and capital investments reduced to the same (annual) dimension in accordance with the standard of comparative effectiveness.

$$C_i + E_н K_i \rightarrow \text{minimum} \tag{13}$$

where: K_i are capital investments for each variant;
C_i are current expenditures (production costs) on the same variant;
$E_н$ is the standard coefficient of comparative effectiveness.

The reduced expenditures can be also calculated according to the following formula:

$$K_i + T_н \cdot C_i \rightarrow \text{minimum} \tag{13a}$$

where: $T_н$ is the standard period of payoff of additional capital investments, that is, their difference in variants as a result of production cost savings--value, reverse $E_н$.

With a limited number of variants their successive pair comparison is possible according to the following formulas:

$$E = \frac{C_1 - C_2}{K_2 - K_1}; \quad T = \frac{K_2 - K_1}{C_1 - C_2}, \tag{14}$$

where: E is the coefficient of comparable effectiveness;
T is the period of payoff of additional capital investments, that is, their difference in variants as a result of production cost savings;
K_1, K_2 are capital investments in the compared variants;
C_1, C_2 is the production cost of the compared variants.

If $E \geqslant E_н$ or $T \leqslant T_н$, additional capital investments and, consequently, the more capital intensive variant or the considered new technology measure are effective.

The selection of the best variant of new technology not requiring capital investments (for example, new techniques or new production organization) is made according to the minimum of current expenditures.

28. Indicators K_i and C_i can be applied both in the full amount of capital investments and the production cost of annual output and in the form of specific values, that is, specific capital investments per unit of output and the production cost of a unit of output with a mandatory observance of a full comparability of variants based on the equality of the consumer effect.

All the compared variants of new technology should be brought into a comparable form in terms of all criteria (volume of output, its composition, quality and periods of production, as well as social effects, including environmental protection), apart from the criterion whose effectiveness is determined. The comparability of variants can be attained on the basis of the calculations of expenditures on the creation of "supplementing" capacities and other calculations, whose order is determined by sectorial instructions.

29. The standard coefficient of comparative effectiveness of new technology throughout the national economy is established for the 12th Five-Year Plan at a level not below 0.12. The indicated standard is designed to commensurate incremental values alone and should not be identified with the standard of total effectiveness. If necessary, for reasons of the national economic or defense significance of sectors, stimulation of technical progress and consideration of dissimilar wage levels (zonal and sectorial), differences in the price level, long duration of overall scientific and technical programs and regional differences, deviations from the standard coefficient of effectiveness of new technology established for the entire national economy are permitted for individual regions and sectors. They are determined by sectorial instructions and coordinated with the USSR State Planning Committee and the State Committee for Science and Technology.

Deviations from the standard coefficient of comparative effectiveness should be such that it is not below 0.08-0.10 and does not exceed 0.20-0.25. The standard of comparative economic effectiveness is subject to a revision, which it is advisable to time to coincide with periods of drafting of five-year plans.

30. When the comparative effectiveness of new technology at planning and drafting stages is determined, indicators of the best available solutions of a given technical problem are taken as initial indicators and, when new technology is introduced, indicators of the best domestic and foreign technology introduced or developed in drafts. The indicators of the considered variants are compared with similar indicators of compared projects and indicators of economic effectiveness attained during previous periods.

When the value of the economic effect from the introduction of new technology under specific conditions at the cost accounting level is determined, indicators of the replaced technology are taken as initial indicators.

31. In the calculations of the economic effectiveness of new technology the comparability of expenditures and the effect in the compared variants in the following should be observed:

a) range of enterprises and production sectors;

b) time of expenditures and derivation of the effect;

c) prices adopted for the expression of expenditures and the effect;

d) nature of expenditures and the effect from the point of view of simple and expanded reproduction;

e) range of expenditures forming part of the volume of capital investments;

f) degree of utilization of the economic potential;

g) social conditions;

h) effect on the environment;

i) methods of calculating cost indicators utilized for calculations of effectiveness.

32. In the comparison of variants of new technology: If they differ in the length of its development, production, introduction and application, in the distribution of capital investments throughout the periods of these stages or in the possibility of its introduction in stages without damage for the fulfillment of production assignments, the effect of the different times of expenditures on the effectiveness of variants of new technology is calculated with the utilization of the lowered (preferential) standard of effectiveness for a reduction of expenditures incurred at different times ($E_{НП}$). This stimulates the selection of a more rapidly implemented variant of new technology, that is, contributes to the acceleration of scientific and technical progress.

The reduction of expenditures of later years to the current moment is made by multiplying them by the coefficient of reduction calculated according to the following expression:

$$B = \frac{1}{(1 + E_{нв})^t}, \qquad (15)$$

where: B is the coefficient of reduction;
t is the period of time, in years;
$E_{НП}$ is the standard of effectiveness for a reduction of expenditures incurred at different times.

The standard of effectiveness for a reduction of expenditures incurred at different times is established for new technology at 0.04.

A reduction of expenditures incurred at different times is utilized only in calculations of the economic effectiveness of variants and cannot serve as the basis for a change in the estimated cost of construction.

33. When variants of new technology differing in the length of implementation are compared, their comparability is ensured either by means of an evaluation, with the aid of the coefficient of reduction, of the losses resulting from "freezing," or by taking into consideration the one-time real effect in the form of additional net output or profit obtained when projects are commissioned more rapidly, with due regard for the effects of associated (consuming) sectors from the utilization of output obtained ahead of schedule.

34. The economic effectiveness of variants of new technology with due regard for regional differences is determined by a comparison of the indicators of reduced expenditures with due regard for associated capital investments in transport and transport expenditures on the delivery of output to consumption regions and its storage.

35. When the technical and economic indicators of the developed plans of new technology are compared with the economic indicators of existing technology, it is necessary to correct the latter with due regard for their change as a result of the best utilization of existing productive capital at the moment of realization of drafts envisaged by the plan. For example, when production costs are compared, the draft of new technology has an advantage over existing technology if:

$$(C_д - \Delta C) > C_{н.т.} \tag{16}$$

where:
- $C_д$ is the production cost of existing technology in the year of calculations;
- ΔC is the saving of production cost as a result of the implementation of measures before the introduction of new technology;
- $C_{н.т.}$ is the production cost according to the draft with the utilization of new technology.

36. In cases when the considered variant of new technology is of overall significance, its effectiveness is determined by a comparison with alternative variants separately accomplishing in corresponding national economic sectors the tasks realized owing to overall new technology. In the interest of cost accounting expenditures on new technology measures for overall purposes can be distributed among individual sectors, associations and enterprises--participants in the complex. Distribution is made by assigning to every participant in the complex the share of expenditures determined in proportion to the economic effect from an overall implementation of the project or measure obtained by it.

$$\sum_{i=1}^{n} Э_i = Э_{об} \tag{17}$$

$$k_i = \frac{Э_i \cdot 100}{Э_{об}}, \quad \sum_{i=1}^{n} k_i = 100\% \tag{18}$$

$$\sum_{i=1}^{n} З_i = З_{об} \tag{19}$$

$$З_i = З_{об} \cdot k_i. \tag{20}$$

where:
- $Э_{об}$ is the total effect of an overall utilization of new technology;
- $Э_i$ is the effect of utilization of new technology in i sector;
- k_1 is the share of the effect of i sector in the total effect (in %%);
- $З_{об}$ are total expenditures on overall new technology;
- $З_1$ are the expenditures of i sector on overall new technology.

37. In sectors where production is based on a direct utilization of natural resources, including in extractive sectors, in calculations of comparative effectiveness, when new technology is evaluated, it is possible to apply closing, maximum permissible expenditures approved as the standard for the next five-year plan in accordance with the established procedure.

38. When new technology changing the quality and operating properties of output is introduced, changes in expenditures and the effect both in the sphere of production and in the sphere of application of new technology should be taken into consideration. The economic effectiveness of capital investments, when the properties and quality of raw materials and supplies are improved and when new items are developed, is determined with due regard for capital investments and current expenditures in the production, transportation and utilization of these raw materials and supplies. The calculation should be performed for the annual volume of consumption of materials envisaged in the draft.

39. When the comparative effectiveness of new technology replacing heavy physical manual labor is evaluated, the standard of comparative effectiveness reduced by one-half is applied and 40 percent is added to the wages of workers engaged in heavy manual labor, having in mind payments and benefits from public consumption funds. When workers in manual labor are freed and used in other jobs, the possibility of creation by them of the surplus product equal to its average quantity per worker engaged in the national economy is also taken into consideration.

40. The economic effect of capital investments in the development of new and improvement in existing types of machinery, equipment, mechanisms, instruments and other implements of production is realized not only in the sphere of production of new technology, but also in the sphere of its application (operation). The value of this part of the economic effect is determined by commensurating the consumer's capital investments for the purchase of the indicated equipment with a reduction in the production costs of products or operations performed by means of this equipment. The total effect of new technology at the cost accounting level of management will be:

$$Э_{нт} = Э_{пр} + Э_{пот} \quad (21)$$

$$Э_{пр} = (Ц_{ст} - С_{ст}) - (Ц_{нт} - С_{нт}) \quad (22)$$

$$Э_{пот} = E_н K_{нт} - (C_1 - C_2). \quad (23)$$

where:

$Э_{НТ}$	is the total effect from new technology;
$Э_{ПР}$	is the effect for the producer of new technology;
$Э_{ПОТ}$	is the effect for the consumer of new technology;
$Ц_{СТ}$, $Ц_{НТ}$	is the wholesale price[1] of old and new technology;
$С_{СТ}$, $С_{НТ}$	is the production cost of old and new technology;
$E_Н$	is the coefficient of comparative effectiveness;
$K_{НТ}$	are the consumer's capital investments in new technology;
C_1, C_2	is the production cost of annual output before and after the introduction of new technology.

At the same time, changes in the labor, material and capital intensiveness of output and in the length of construction, as well as other factors, are also taken into consideration. The full effect value represents the algebraic sum

1. With due regard for increases (or reductions) of up to 30 percent depending on the quality category according to the decree No 814 dated 18 August 1983 of the CPSU Central Committee and the USSR Council of Ministers.

of effects of the producer and consumer of new technology with due regard for the degree of mastering of the economic potential and the period of effective application of new technology. When effectiveness is calculated, the total expenditures of the producer and consumer are compared with it (see paragraphs 9 and 10).

41. The comparative economic effectiveness of the variants of new technology measures at existing enterprises implemented with the capital of the production development fund and bank credits for the implementation of measures for the introduction of new technology, mechanization, automation and modernization of equipment, replacement of fixed capital, purchase of means of transportation and improvement of production and labor organization, as well as other measures, is determined by calculations for an increase in profit or decrease in production cost in comparison with the capital investments in these measures.

42. When variants of new technology are compared, the entire initial information on expenditures and results for all variants should be known. However, in individual cases and sectors (for example, agriculture), as well as especially in long-term planning and forecasting and in the sphere of scientific research and experimental designing, a significant part of the initial information is of a probability nature. In these cases the minimum of a mathematical expectation of the values of the reduced expenditures can be utilized as the criterion of effectiveness (see paragraph 53).

IV. Determination of Economic Effectiveness of New Technology When Existing Enterprises Are Retooled

43. The effectiveness of the expansion of an existing enterprise carried out through the creation of new work places should be compared not only with the effectiveness of the retooling of this enterprise, but also with the effectiveness of new construction. In these comparisons it is necessary to take into consideration the entire volume of capital investments--productive and nonproductive. Expenditures (savings) connected with an additional enlistment of labor resources, as well as the effects from additional volumes of output obtained as a result of a more rapid mastering of new capacities introduced during the retooling of enterprises, as compared with newly built ones, should be taken into account. Furthermore, the effect from the disengagement of workers as a result of retooling and other new technology measures should be taken into consideration (see paragraph 25a).

44. In the calculations of the economic effectiveness of work on retooling it is necessary to take into consideration its social consequences--improvement and facilitation of working conditions and environmental protection. These social consequences are taken into account in physical and, if possible, in value form as well.

45. The comparative economic effectiveness of new technology, when existing enterprises are retooled, is determined by means of a comparison of the indicators of the variants of this work with the indicators of existing production and with the variants of new construction. At the same time, it is necessary

to take into consideration the possible losses of net output (standard) and profit or the increase in current expenditures during the period of performance of this work.

46. The selection of the variant or another type of work is made on the basis of calculations of comparative effectiveness. In cases when retooling is carried out for the purpose of raising the technical level and reducing the current expenses of production, while the initial volume of output is retained, the evaluation of effectiveness is made by means of a comparison of the saving resulting from the decrease in production cost with the capital investments producing it.

47. The evaluation of the effectiveness of work on retooling or other new technology measures aimed at an increase in capacity and output is made by means of a comparison:

a) with the indicators of the plan of the new enterprise, whose output is equal to the increase in output as a result of this work;

b) with the indicators of the existing enterprise, if a comparison with the plan for the construction of the new enterprise is impossible. In this case the saving resulting from the decrease in production cost is the effect of new technology measures.

48. If retooling or other new technology measures aim at expanding the assortment and improving the quality of output, the following should be differentiated:

a) improvement in the quality of output;

b) organization of the production of new types of products for the same consumption purposes as those of previously produced products.

Not only the effect for the consumer, but also the growth of gross output with a relatively smaller growth of current production expenses, which brings about not only an increase in profit, but also an increase in production profitability, is the economic result in the first case. When calculating the economic effectiveness for the second case, economic indicators (capital investments and current expenditures) should be compared with similar indicators for the new enterprise.

49. In case of introduction of new technology in extractive sectors of industry, which provides for an incidental extraction of valuable components from the mined mineral, the evaluation of effectiveness should be made by comparing the expenditures connected with it with the increase in net output or profit as a result of its application with due regard for the effect from the utilization of these valuable components.

V. Determination of Economic Effectiveness of Scientific Research and Planning Work on New Technology

50. Calculations of economic effectiveness are performed for scientific research and planning work aimed at the development of new technological processes, machines and materials and for research in the field of natural sciences, which can be utilized for the development and application of new technology.

When performing calculations of the economic effectiveness of scientific research, along with the expenditures of scientific research institutes, expenditures connected with the introduction of the results of this work are taken into consideration.

51. Scientific research for which the economic effect connected with new technology is calculated includes the following:

a) work directly aimed at the development of new technological processes and methods of production in industry, construction, agriculture and other national economic sectors; at the development of new machines, mechanisms, facilities for the automation of instruments and equipment aimed at an improvement in the designs, parameters and quality of products; at the development and introduction of new types of energy, new materials and new substances and preparations; at the development of enterprises, buildings, installations and building structures of a new type;

b) research in the field of fundamental sciences, that is, mathematics, physics, chemistry, biology and so forth, which are of a theoretical nature, but can be utilized for an improvement in material production.

52. The evaluation of the economic effectiveness of scientific research results is made on the basis of the determination:

a) of the economic effect as compared with the highest attained level of science and technology for disclosing the advisability of introduction;

b) of the total value of the economic effect attained as a result of introduction, as compared with the planned or actual level of technology, with due regard for the scale, periods of introduction and length of existence of the scientific result with consideration of obsolescence.

c) of the economic and technical indicators that must be attained so that the proposed measure is effective.

The following are taken as initial for comparison:

a) when economic effectiveness is determined, the highest level of technology introduced, planned or at the stage of completed scientific research in the USSR and abroad;

b) when the value of the economic effect from introduction is determined, the level of replaced technology, which will be attained at the moment of introduction of given scientific research into production.

53. As a result of scientific research an economic potential is created, being realized as scientific research results are introduced into production. The economic potential of scientific research is measured by the maximum economic effect, which can be attained on the basis of the introduction of the results of this research into production during the period under review with the proposed volume of introduction. The measurement of an economic potential timed to coincide with a specific year of introduction is also permitted.

If scientific research is connected with the risk of obtaining a negative result, the economic potential is determined as a mathematical expectation according to the following formula:

$$Э = Э_t \cdot p - Б \cdot q, \qquad (24)$$

where: Э is the economic potential of scientific research connected with the risk of a negative result;
$Э_t$ is the calculated economic potential during the period of t years;
p is the probability of a positive research result;
Б are excessive expenditures in case of a negative result;
q is the probability of a negative outcome of scientific research.

54. Before the transmission of scientific research results for introduction into production a number of expenditures are incurred. They are not reflected in production cost, or in the structure of capital investments, but should be taken into consideration during an overall evaluation of the effectiveness of scientific research. Generally, these nonproductive expenditures are made up of the cost of the following work:

a) scientific research; b) experimental planning; c) designing of experimental equipment, apparatus and instruments; d) manufacture and testing of models in the process of scientific research; e) pilot production or experimental construction necessary for testing scientific research results. Nonproductive expenditures incurred at different times are reduced to the commensurable value in the first year of introduction of scientific research results into production both for the new and the initial variant with the utilization of the coefficient of reduction (see paragraph 32).

55. The effectiveness of expenditures on long-term overall scientific and technical programs is determined on the basis of the calculation of the integral effect during the period of implementation of the program and the subsequent effective utilization of its results.

56. Calculations of the economic effectiveness of scientific work on new technology are performed in the course of drafting of long-term and annual plans in scientific research organizations or the development of programs and preparation of reports.

At the initial stage of scientific research calculations of economic effectiveness are performed with a certain approximation. At the next stages--designing, planning, testing, mastering of production and so forth--it is necessary to systematically refine calculations, checking how the actually attained economic and technical indicators correspond to the calculated ones.

57. When the effectiveness of scientific research on new technology is evaluated, it is necessary to disclose, along with economic, social results not fully reflected in the cost evaluation:

liquidation of heavy physical or monotonous labor and the maximum possible improvement and facilitation of working conditions;

rise in the level of labor safety techniques;

improvement in the population's living and working conditions;

elimination of occupational injuries and diseases;

improvement in the environment.

58. When the effectiveness of design solutions of new technology is evaluated, the following are utilized as indicators:

the production cost of the annual volume of output or a unit of output (for production enterprises);

annual operating expenditures, including depreciation for full replacement (for projects of the nonproductive sphere);

the full estimated cost of retooling or other new technology measures;

specific capital investments per unit of output in a year (or per unit of net output);

expenditures on the transport of finished products to consumers;

associated expenditures and results attained in associated sectors.

59. For an analysis of factors in the increase in effectiveness and a fuller technical and economic substantiation, when design solutions of new technology are compared, the following indicators are applied: labor productivity in net output, utilization of production areas and fixed productive capital, specific expenditures of raw materials and fuel-power resources per unit of the final products of enterprises and others.

VI. Determination of Actual Effectiveness of New Technology

60. The determination of the actual economic effectiveness of new technology aims at checking the effectiveness of the incurred expenditures on the retooling of existing enterprises and projects and other new technology measures, as

well as at systematically controlling to what extent the actual indicators of new technology correspond to the projected calculations and planned assignments for the economic effectiveness of new technology in terms of its individual types, enterprises, associations, sectors and the national economy as a whole.

When actual effectiveness is determined, report indicators are compared with planned and standard indicators.

61. Indicators of the actual economic effectiveness of new technology are calculated for individual projects, enterprises, associations and subsectors. Calculations are performed with the utilization of comparable prices. The total (absolute) and comparative effectiveness of new technology at a given stage of mastering of its designed capacity and of other planned economic indicators is determined. The actual effectiveness of new technology is compared with the one that is prescribed by the plan.

62. The total effectiveness of new technology at enterprises (projects) and their groups is determined by comparing the increase in net output (profit) produced by it with the actual expenditures on new technology. The indicators of total effectiveness make it possible to determine the return on the expenditures on new technology.

Comparative effectiveness is calculated for disclosing the increase in effectiveness at a given enterprise applying new technology as compared with other similar enterprises. Calculations of total and comparative effectiveness mutually supplement each other and are equally necessary when the actual economic effectiveness of new technology is analyzed.

63. When the total (absolute) actual economic effectiveness of new technology at the level of individual enterprises and projects is analyzed, the coefficient of effectiveness (profitability) can be utilized as an indicator.

The implemented new technology measures can be considered economically effective when the obtained indicators are equal to or better than the standard ones. At the same time, the sectorial standard can be utilized as the standard for a group of enterprises.

64. A calculation is also performed of the indicator of the integral effect in the form of the period during which the algebraic sum of the effect reaches the amount of expenditures on the development, production, introduction and application of new technology (standard period of payoff of capital investments).

Data on profits and losses from the beginning of the commissioning of the enterprise that has introduced new technology or the fully retooled enterprise can be utilized for the calculation of this indicator.

65. In the process of analysis, if possible, the effect of the following factors on the actual effectiveness of new technology is disclosed: the time gap between the beginning of development or introduction and the derivation of the effect, acceleration of the commissioning and mastering of the planned indicators of new technology, rise in the level of equipment of enterprises, labor productivity growth and improvement in the quality of output and in social results.

The following were utilized in the preparation of the draft of this methodology: The third edition of the Standard Methodology for Determining the Economic Effectiveness of Capital Investments (1980), as well as the Methodology for Determining the Economic Effectiveness of Introduction of New Technology and Mechanization and Automation of Production Processes in Industry (1962) and Basic Methodological Provisions for Determining the Economic Effectiveness of Scientific Research (1964).

11,439
CSO: 1820/46 END

END OF FICHE DATE FILMED

30 Jan 1985 D.D.